State: MAHARASHTRA

Agriculture Contingency Plan for District: NANDURBAR

1.0 District Agriculture profile					
1.1	**Agro-Climatic/Ecological Zone**				
	Agro Ecological Sub Region (ICAR)	Deccan Plateau,hot semi arid eco region (6.1)			
	Agro-Climatic Region (Planning Commission)	Western Plateau & hills region (IX)			
	Agro Climatic Zone (NARP)	Western Maharashtra Plain Zone (MH-6)			
	List all the districts or part thereof falling under the NARP Zone	Western Ghat Zone – Nandurbar, Nashik, Satara, Kolhapur Sub Mountain Zone - Nandurbar, Dhule, Nashik, Pune, Kolhapur			
	Geographic coordinates of district headquarters	Latitude	Longitude	Altitude	
		$21^0$22'12.86" N	$74^0$14"58.61 E	235 m	
	Name and address of the concerned ZRS/ ZARS/ RARS/ RRS/ RRTTS	Regional Extension Centre , College of Agriculture,Parola Road , Dhule Tal & Dist :Dhule, PIN - 424 004, Phone (O) 02562-230050, Fax 02562-230 127, email : dr_drmsm@yahoo.com ZARS, Igatpuri, PIN –422403 (M.S.) - Western Ghat Zone ZARS, Kolhapur, PIN – 416012 (M.S.) - Sub Mountain Zone			
	Mention the KVK located in the district	Krishi Vigyan Kendra, Kolade, Tal. & Dist. Nandurbar			
1.2	**Rainfall**	Normal RF(mm)	Normal Rainy days	Normal Onset	Normal Cessation
	SW monsoon (June-Sep):	831.0	26	1st fortnight of June	1st fortnight of October
	NE Monsoon(Oct-Dec):	41.0	8	--	--
	Winter (Jan- Feb)	-		-	-
	Summer (March-May)	-		-	-
	Annual	872.0	34	-	-

Source: Directorate of Finance & Statistics, Govt of Maharashtra,Mumbai-2008 & NBSS & LUP, Nagpur

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)	503.0	297.0	105.0	20.0	27.0	4.0	0.0	24.0	1.0	25.0

Source: 1.Agricultural Statistical Information, Maharashtra State 2006 (Part II)

2. District Social & Economical Report 2008-09(Nandurbar District**)**

1. 4	**Major Soils**	**Area ('000 ha)**
	Shallow black soils	118.8
	Medium deep black soils	103.9
	Deep black soils	74.2

(Source: NBSS & LUP, Nagpur)

1.5	**Agricultural land use**	**Area ('000 ha)**	**Cropping intensity %**
	Net sown area	297.0	133.6
	Area sown more than once	100.0	
	Gross cropped area	397.0	

1.6	**Irrigation**	**Area ('000 ha)**		
	Net irrigated area	66.0		
	Gross irrigated area	91.0		
	Rainfed area	231.0		
	Sources of Irrigation	**Number**	**Area ('000 ha)**	**Percentage of total irrigated area**
	Canals	--		
	Tanks	--	--	--
	Open wells	20967	31.9	57.5
	Bore wells	106	1.1	2.4
	Lift irrigation schemes	--	--	--
	Micro-irrigation	--	--	--
	Other sources (Water lifted from river along the coarse & other sources)	--	22.4	40.4
	Total Irrigated Area		55.4	100
	Pump sets	18267	--	--
	No. of Tractors	10222	--	--
	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	NA	--	--
	Critical	NA	--	--
	Semi- critical	NA	--	--
	Safe	6	100	Satisfactory
	Wastewater availability and use	NA	--	--
	Ground water quality	NA		

Source: 1. District Social & Economical Report 2008-09(Nandurbar District)
2. District Social & Economical Report 2007-08(Nandurbar District)

1.7 Area under major field crops & horticulture (2008)

1.7	Major field crops cultivated	Area ('000 ha)							
		Kharif			*Rabi*				
		Irrigated	**Rainfed**	**Total**	**Irrigated**	**Rainfed**	**Total**	**Summer**	**Grand total**
	Cotton	*	53.3	53.3	-	-	--	-	**53.3**
	Kharif Sorghum	-	46.1	46.1	-	-	--	-	**46.1**
	Paddy	-	26.7	26.7	-	-	--	-	**26.7**
	Pearl millet	-	21.3	21.3	-	-	--	-	**21.3**
	Maize	-	20.7	20.7	-	-	--	-	**20.7**
	Soybean	-	5.3	5.3	-	-	--	-	**5.3**
	Rabi Sorghum	-	-	-	22.4	-	22.4	-	**22.4**
	Wheat	-	-	-	6.4	-	6.4	-	**6.4**
	Chick pea	-	-	-	7.6	-	7.6	-	**7.6**
	Groundnut	-	-		-	-		6.49	**6.4**
	Horticulture crops - Fruits	**Area ('000 ha)**							
		Total			**Irrigated**			**Rainfed**	
	Mango	6.9			--			6.9	
	Ber	1.2			--			1.2	
	Guava	1.1			1.1			--	
	Custard apple	0.8			--			0.8	
	Sapota	0.7			0.7			--	
	Horticulture crops - Vegetables	**Total**			**Irrigated**			**Rainfed**	
	Chilli	9.0			9.0			--	
	Onion	2.2			2.2			--	
	Brinjal	0.3			0.3			--	
	Tomato	0.1			0.1			--	
	Medicinal and Aromatic crops	**Total**			**Irrigated**			**Rainfed**	
	Citronella	0.01			0.01			-	
	Others	0.01			0.01			--	
	Plantation crops	**Total**			**Irrigated**			**Rainfed**	
		-			-			-	
	Fodder crops	**Total**			**Irrigated**			**Rainfed**	
	All crops	0.8			0.8			--	
	Total fodder crop area	0.8			--			--	
	Grazing land	29.0			--			--	
	Sericulture etc	--			--			--	
	Others				--			--	

1.8	**Livestock**	**Male (‘000)**	**Female (‘000)**	**Total (‘000)**
	Non descriptive Cattle (local low yielding)	199.6	214.4	414.1
	Crossbred cattle	328.1	796.9	1125.0
	Non descriptive Buffaloes (local low yielding)	1.7	49.0	50.7
	Graded Buffaloes	0.9	11.2	12.2
	Goat	156.4	162.2	318.7
	Sheep	10.4	20.7	31.1
	Others (Camel, Pig, Yak etc.)			
	Commercial dairy farms (Number)			

1.9	**Poultry**	**No. of farms**	**Total No. of birds (‘000)**
	Commercial	46	926.9
	Backyard	0	955.2

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)	
	NA	NA	NA	NA	NA	NA

ii) Inland (Data Source: Fisheries Department)	**No. Farmer owned ponds**	**No. of Reservoirs**	**No. of village tanks**
	0	39	400

B. Culture

	Water Spread Area (ha)	**Yield (t/ha)**	**Production (tons)**
i) **Brackish water** (Data Source: MPEDA/ Fisheries Department)	NA	NA	NA
ii) **Fresh water** (Data Source: Fisheries Department)	3742	0.2	815
Others	NA	NA	NA

1.11 Production and Productivity of major crops (2004-2008)

1.11	Name of crop	*Kharif*		*Rabi*		*Summer*		Total		Crop residue as fodder (‘000 tons)
		Production ('000 t)	Productivi-ty (kg/ha)	Production ('000 t)	Productivity (kg/ha)	Product-ion ('000 t)	Productivity (kg/ha)	Product-ion ('000 t)	Productivity (kg/ha)	
Major Field crops (Crops to be identified based on total acreage)										
	Cotton	7.8	1.4 (kg-lint)	-	-	-	-	7.8	1.4 (kg-Lint)	-
	Kharif Sorghum	50.8	1101	-	-	-	-	50.8	1101	-
	Paddy	23.0	861	-	-	-	-	23.0	861	-
	Pearlmillet	11.7	658					11.7	658	
	Maize	30.6	1481	-	-	-	-	30.6	1481	-
	Sugarcane	915.8	64330	-	-	-	-	915.8	64330	-
	Rabi Sorghum	-	-	1.9	882	-	-	1.9	882	-
	Wheat	-	-	10.1	1566	-	-	10.1	1566	-
	Chickpea	-	-	5.2	681	-	-	5.2	681	-
Major Horticultural crops										
	Mango	467	67000	-	-	-	-	467	67000	-
	Ber	32.4	27000	-	-	-	-	32.4	27000	-
	Guava	20.2	18000	-	-	-	-	20.2	18000	-
	Custard apple	23.1	26000	-	-	-	-	23.1	26000	-
	Sapota	18.7	25000	-	-	-	-	18.7	25000	-
	Chilli	99	11000	-	-	-	-	99	11000	-
	Onion	26.4	12000	-	-	-	-	26.4	12000	-

1.12	**Sowing window for 5 major field crops**	Cotton	*Kharif* Sorghum	Paddy	Pearlmillet	Maize	*Rabi* Sorghum	Chick pea
	Kharif Rainfed	3rd week of June- 2nd week of July	3rd week of June- 2nd week of July	3rd week of June-2nd week of July	3rd week of June- 2nd week of July	3rd week of June- 2nd week of July	--	--
	Kharif Irrigated	1st week of May- 1st week of June	--	--	--	--	--	--
	Rabi Rainfed	--	--	--	--	--	3rd week of September.- 2nd week of October.	2nd week of October- 2nd week of November.
	Rabi Irrigated	--	--	--	--	--	--	--

1.13	**What is the major contingency the district is prone to?**	**Regular**	**Occasional**	**None**
	Drought	-	√	-
	Flood	-	-	√
	Cyclone	-	-	√
	Hail storm	-	-	√
	Heat wave	-	-	√
	Cold wave	-	-	√
	Frost	-	-	√
	Sea water intrusion	-	-	√
	Pests and disease outbreak (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

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 June 4th Week	Shallow black soils	Pearlmillet	Shraddha, Saburi, Shanti	- Application of 25 kg K_2O per ha as basal dose - One hoeing and weeding before 30 DAS	**Seed source :** • Central campus MPKV, Rahuri, • College of Agril., Pune, Kolhapur and Dhule NSC, MSSC, Private co. Distributors
		Greengram/ Blackgram	Greengram – Phule Vaibhav, Blackgram – TPU-4	One hoeing and weeding before 30 DAS	
		Sorghum	CSH-14,16,17	--	
	Medium deep black soils	Upland Paddy	Phule Radha, Indrayani, Bhogavati	- Direct seeding with seed drill - Weed free condition upto 40 days - N split application (50 kg N at sowing & 50 kg N at 25 DAS)	
		Pigeonpea	Pearl millet (Shraddha, Saburi, Shanti) + Pigeonpea (Vipula/BSMR-736) (2:1), Soybean (JS-335) + Pigeonpea	- Preparation of conservation furrows after harvest of pearlmillet / soybean for moisture conservation - Weed free condition upto 30 DAS	

			(Vipula/BSMR-736) (3:1)		
		Soybean	JS-335	- Hoeing at 25 DAS - Weed free condition upto 30 DAS	
	Deep black soils	Cotton	Bt cotton	- Hoeing at 20, 60 DAS - Weeding at 30 DAS	
		Maize	Karveer, Phule Rajarshee	- Sowing on ridges - Weeding at 25 DAS	

Condition			**Suggested Contingency measures**		
Early season drought (delayed onset)	**Major farming situation**	**Normal crop/cropping system**	**Change in crop/cropping system**	**Agronomic measures**	**Remarks on Implementation**
Delay by 4 weeks July 2nd week 28MW	Shallow black soils	Pearlmillet	Shraddha, Saburi, Shanti	- Application of 25 kg K_2O per ha as basal dose - One hoeing and weeding before 30 DAS	**Seed source :** • Central campus MPKV, Rahuri, College of Agril., Pune, Kolhapur and Dhule NSC, MSSC, Private co. Distributers
		Greengram/ Blackgram	Pearlmillet (Shraddha, Saburi, Shanti)	As above	
		Sorghum	As above	As above	
	Medium deep black soils	Upland Paddy	Phule Radha, Pavana	- Direct seeding with seed drill - Weed free condition upto 40 days - N split application (50 kg N at sowing & 50 kg N at 25 DAS)	
		Pigeonpea	Pigeonpea (Vipula / BDN-708) + Clusterbean (1:2)	- Opening of one conservation furrow after harvest of clusterbean	
		Soybean	Sunflower (SS-56 / Bhanu / Phule Raviraj)	-Seed treatment with Imadachloprid 70 WS @ 5-7 g per kg of seed - Hoeing at 20 DAS - Weeding upto 30 DAS	
	Deep black soils	Cotton	Bt cotton	- Hoeing at 20, 60 DAS - Weeding at 30 DAS	
		Maize	Karveer, Phule Rajarshee	- Sowing on ridges - Weeding at 25 DAS	

Condition			Suggested Contingency measures		
Early season drought (delayed onset)	**Major farming situation**	**Normal crop/cropping system**	**Change in crop/cropping system**	**Agronomic measures**	**Remarks on Implementation**
Delay by 6 weeks July 4th week 30 MW	Shallow black soils	Pearlmillet	Shraddha, Saburi, Shanti	- Application of 25 kg K_2O per ha as basal dose - One hoeing and weeding before 30 DAS	**Seed source :** • Central campus MPKV, Rahuri, College of Agril., Pune, Kolhapur and Dhule NSC, MSSC, Private co. Distributers
		Greengram/ Blackgram	Pearlmillet (Shraddha, Saburi, Shanti)	As above	
		Sorghum	As above	As above	
	Medium deep black soils	Upland Paddy	Sunflower (SS-56 / Bhanu / Phule Raviraj)	-Seed treatment with Imadachloprid 70 WS @ 5-7 g per kg of seed - Hoeing at 20 DAS - Weeding upto 30 DAS	
		Pigeonpea	Pigeonpea (Vipula / BDN-708) + Clusterbean (1:2)	Opening of one conservation furrow after harvest of clusterbean	
		Soybean	Sunflower (SS-56 / Bhanu / Phule Raviraj)	-Seed treatment with Imadachloprid 70 WS @ 5-7 g per kg of seed - Hoeing at 20 DAS - Weeding upto 30 DAS	
	Deep black soils	Cotton	Bt cotton	- Hoeing at 20, 60 DAS - Weeding at 30 DAS	
		Maize	Karveer, Phule Rajarshee	- Sowing on ridges - Weeding at 25 DAS	

Condition			Suggested contingency measures		
Early season drought (delayed onset)	**Major farming situation**	**Normal crop/cropping system**	**Change in crop/cropping system**	**Agronomic measures**	**Remarks on Implementation**
Delay by 8 weeks August 2nd week	Not Applicable				

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 after sowing leading to poor germination/crop stand etc.	Shallow black soils	Pearlmillet	Protective Irrigation or resowing in case of failure	Hoeing and Weeding	Use of farm pond for life saving irrigation
		Greengram/ Blackgram	Resowing	As above	
		Sorghum	--	As above	
	Medium deep black soils	Upland Paddy	--	Weeding and intercultivation	
		Pigeonpea	- Gap Filling	• Spray 2% urea or DAP • Hoeing/weeding	
		Soybean	In case of less than 30 % germination take up resowing with wider spacing of 45 cm with sufficient soil moisture.	• Hoeing/weeding	
	Deep black soils	Cotton	Gap filling	Weeding, Protective irrigation	
		Maize	As above	As above	

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**
Mid season drought (long dry spell, consecutive 2 weeks rainless (>2.5 mm) period) **At vegetative stage**	Shallow black soils	Pearlmillet	Give protective Irrigation	• Hoeing/Weeding • Use of 8 % kaolin spray • 2 % urea spray	Use of farm pond for life saving irrigation
		Greengram/ Blackgram	--	--	
		Sorghum	Give protective Irrigation	• Hoeing/Weeding • Use of 8 % kaolin spray • 2 % urea spray	
	Medium deep black soils	Upland Paddy	Give protective Irrigation	Weeding and interculture	
		Pigeonpea	Protective irrigation and thinning	• Hoeing/Weeding • Use of 8 % kaolin spray	

				• 2 % urea spray, • Opening of conservation furrows in between two rows of pigeonpea	
		Soybean	Protective irrigation	• Use of 8 % kaolin spray • 2 % urea spray, • Hoeing and weeding	
	Deep black soils	Cotton	As above	• Use of 8 % kaolin spray • Hoeing and weeding, • 2 % urea and or 2 % DAP spray	
		Maize	As above	• 2 % urea spray, • Hoeing and weeding	

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**
Mid season drought (long dry spell, consecutive 2 weeks rainless (>2.5 mm) period) **At flowering/ fruiting stage**	Shallow black soils	Pearlmillet	Give protective Irrigation	• Hoeing/Weeding • Use of 8 % kaolin spray • 2 % urea spray,	Use of farm pond for life saving irrigation
		Greengram/ Blackgram	--	--	
		Sorghum	Give protective Irrigation	• Hoeing/Weeding • Use of 8 % kaolin spray • 2 % urea spray	
	Medium deep black soils	Upland Paddy	Give protective Irrigation	Weeding and interculture	
		Pigeonpea	Protective irrigation and thinning	• Hoeing/Weeding • Use of 8 % kaolin spray • 2 % urea spray, • Opening of conservation furrows in between two rows of pigeonpea	
		Soybean	Protective irrigation	• Hoeing and weeding	
	Deep black soils	Cotton	As above	• Use of 8 % kaolin spray • Hoeing and weeding,	

				• 2 % urea and or 2 % DAP spray	
		Maize	As above	--	

Condition			**Suggested Contingency measures**		
Terminal drought (Early withdrawal of monsoon)	**Major farming situation**	**Normal crop/cropping system**	**Crop management**	**Rabi crop planning**	**Remarks on Implementation**
	Shallow black soils	Pearlmillet	Protective irrigation, In case of poor grain filling harvest for fodder	No rabi crop	Use of farm pond for life saving irrigation
		Greengram/ Blackgram	Harvest the crop at physiological maturity	Chickpea (Vijay /Digvijay) / Safflower (Bhima) / Sunflower (SS-56 / Bhanu)	
		Sorghum	Protective irrigation, In case of poor grain filling harvest for fodder	Chickpea (Vijay /Digvijay) / Safflower (Bhima) / Sunflower (SS-56 / Bhanu)	
	Medium deep black soils	Upland Paddy	Harvest the crop at physiological maturity	No *rabi* crop	
		Pigeonpea	Protective irrigation	No *rabi* crop	
		Soybean	Protective irrigation	Chickpea (Vijay /Digvijay) or Wheat (Trimbak, Panchavati, Godavari) under assured irrigation	
	Deep black soils	Cotton	As above	No *rabi* crop	
		Maize	As above	Chickpea (Vijay /Digvijay/ Virat)	

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	Not applicable				

Condition	Suggested contingency measures				
	Major farming situation	**Normal crop/cropping system**	**Change in crop/cropping system**	**Agronomic measures**	**Remarks on Implementation**
Limited release water in canals due to low rainfall	Not applicable				

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	Not applicable				

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	Uplands, light/red soils- or Medium, medium or deep black soils - tank fed	Cotton	Bt cotton	Skip row irrigation / Drip irrigation	-
		Onion	Late *kharif* onion (Phule Samarth / Baswant 780)	Sprinkler irrigation	
		Chilli	Phule Jyoti / Local	Broad Bed Furrows, Drip irrigation	

Condition			Suggested Contingency measures		
	Major farming situation	**Normal crop/cropping system**	**Change in crop/ cropping system**	**Agronomic measures**	**Remarks on Implementation**
		Tomato	Phule Raja	Drip irrigation	

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	Uplands, light/red soils- or Medium, medium or deep black soils - Open well	Cotton	Bt cotton	Skip row irrigation / Drip irrigation	-
		Wheat	Trimbak, Godavari, Tapovan	Irrigate at critical stages CRI and flowering stage	
		Chickpea	Vijay, Digvijay,	Sprinkler irrigation	
		Onion	Late *kharif* onion (Phule Samarth / Baswant 780)	Sprinkler irrigation	
		Chilli	Phule Jyoti / Local	Broad Bed Furrows, Drip irrigation	-
		Tomato	Phule Raja	Drip irrigation	

2.2 Unusual rains (untimely, unseasonal etc)

Condition	Suggested contingency measure			
Continuous high rainfall in a short span leading to water logging	**Vegetative stage**	**Flowering stage**	**Crop maturity stage**	**Post harvest**
Cotton	Drain out excess water	Drain out excess water	Drain out excess water	Shifting of economic produce to safer place for drying
Pearl millet	• Drain out excess water, • Give second dose of N at optimum soil moisture	• Drain out excess water,	• Harvest at physiological maturity stage	• Harvest & dry in shade
Soybean	• Drain out excess water,	As above	As above	As above
Maize	• Drain out excess water,	As above	As above	As above

	• Give second dose of N at optimum soil moisture			
Sun flower	• Drain out excess water	As above	As above	As above
Upland Paddy	--	--	Drain out excess water	As above

Horticulture crops	**Vegetative stage**	**Flowering stage**	**Crop maturity stage**	**Post harvest**
Mango	Micro site improvement	Provide drainage	Harvest and grade the fruits	--
Guava	As above	As above	As above	--
Custard apple	As above	As above	As above	--
Onion	Drain out excess water	Drain out excess water	Drain out excess water	As above
Chilli	As above	As above	As above	As above
Tomato	As above	As above	As above	As above

Heavy rainfall with high speed winds in a short span				
Horticulture	-	-	-	-

Outbreak of pests and diseases due to unseasonal rains	**Vegetative stage**	**Flowering stage**	**Crop maturity stage**	**Post harvest**
Cotton	**Insect pest** : **Aphids & Jassids and Meally bug-** Sprying of 5% NSKE followed by Diamethoate 30 EC 10 ml/10 L **Disease** : **Alterneria blight**- Spraying of copper oxychloride 50 WP,25 g/10 L	**Insect pest** : **White fly**- Spraying of Diamethoate 30 EC, 10 ml/10 L **Disease : Bacterial Leaf blight**- Spraying of streptocyclin 100 ppm + copper oxychloride 50 WP 25 g/10 L	--	--

Pearlmillet	**Insect pest** : **Grass hopper**-Dusting of methyl parathion 20 kg/ha	**Insect pest** : **Blister beetle**- Dusting of methyl parathion 20 kg/ha	--	--
Soybean	**Insect pest** : **Leaf eating catterpillar**- Use of Pheromon trap, spraying of chloropyriphos 20%, 20ml/10 L	**Disease : Rust**- Spraying of propiconazole 10 ml/10 L	--	--
Maize	**Insect pest**: **Stem fly**- Spraying of endosulphan 35EC , 15 ml/10 L	**Insect pest** : **Spodoptera**- Spraying of chloropyriphos 20EC , 20ml/10 L	--	--
Sunflower	**Insect pest** : **Thrips**- Spraying of imidachloprid 17 SL 4 ml/10 L	**Insect pest - Hairy catterpiller** - Collection and destruction of affected plant parts - Spraying of 50% carbaryl 20 g/10 L	**Insect pest – Heliothis**- - Endosulphon 20 ml / 10 L	--
Horticulture crops				
Onion	**Insect pest** : **Thrips** - Spraying of methyl demeton 10 ml/10 L **Disease : *Alternaria* blight**- Spraying of mancozeb 75 WP, 25 g/10 L	**Insect pest**: **Thrips** - Spraying of methyl demeton 10 ml/10 L **Disease : *Alternaria* blight**- Spraying of mancozeb 75 WP, 25 g /10 L		**Disease : *Aspergillus niger***- Spraying of mancozeb 75 WP, ,25 g/10 L
Chilli	**Insect pest** : **Thrips** - Spraying of methyl dematon 10 ml/10 L	**Disease : Leaf spot** –Spraying of mancozeb 75 WP, 25 g/10 L	**Disease : Fruit rot & Anthracnose**- Spraying of carbendazim 50 WP, 10 g/10 L	
Tomato	**Disease : Alterneria blight**- Spraying of mancozeb 75 WP, 25 g/10 L	**Insect pest** : **Thrips** - Spraying of methyl demeton 10 ml/10 L		**Disease : Fruit rot** - Spraying of copper oxychloride 50 WP, 25 g/10 L

2.3 Floods – Not applicable

2.4 Extreme events: Heat wave / Cold wave/Frost/ Hailstorm /Cyclone – Not applicable

2.5 Contingent strategies for Livestock and Poultry in Nandurbar District

2.5.1 Livestock

	Suggested contingency measures		
	Before the event[s]	**During the event**	**After the event**
Drought			
Feed and fodder availability	Motivating the sugarcane farmers to convert green sugarcane tops in to silage by the end of February Collection of soya meal waste and groundnut cake for use as feed supplement during drought Preserving the green maize fodder as silage Sowing of cereals (Sorghum/Bajra) and leguminous crops (Lucerne, Berseem, Horse gram, Cowpea) during North-East monsoon under dry land system for fodder production. Establishment of fodder bank at village level with available dry fodder (paddy /wheat straw, Sorghum/Bajra stover, groundnut haulms, sugarcane tops) Development of silvopastoral models with Leucaena, Glyricidia, Prosopis as fodder trees and Marvel, Madras Anjan, Stylo, Desmanthus, etc., as under storey grass Encourage fodder production with Sorghum – stylo-Sorghum on rotation basis and also to cultivate short-term fodder crops like sunhemp Promote Azola cultivation at backyard Formation of village Disaster Management Committee Capacity building and preparedness of the stakeholders and official staff for the drought/floods	Harvest and use biomass of dried up crops (paddy/wheat/Sorghum/Bajra,/maize/chickpea/ groundnut/ soya) material as fodder Use of unconventional and locally available cheap feed ingredients especially soya meal waste and groundnut cake for feeding of livestock during drought Harvest all the top fodder available (Subabul, Glyricidia, Pipol, Prosopis etc) and feed the LS during drought Concentrate ingredients such as Grains, brans, chunnies & oilseed cakes, low grade grains etc. unfit for human consumption should be procured from Govt. Godowns for feeding as supplement for high productive animals during drought Promotion of Horse gram as contingent crop and harvesting it at vegetative stage as fodder All the hay should be enriched with 2% Urea molasses solution or 1% common salt solution and fed to LS. Encourage mixing available kitchen waste with dry fodder while feeding to the milch animals	Encourage progressive farmers to grow multi cut fodder crops of sorghum/bajra/maize(UP chari, MP chari, HC-136, HD-2, GAINT BAJRA, L-74, K-677, Ananad/African Tall, Kisan composite, Moti, Manjari, B1-7 on their own lands with input subsidy Supply of quality seeds of COFS 29, Stylo and fodder slips of Marvel, Yaswant, Jaywant, Napier, guinea grass well before monsoon Flushing the stock to recoup Replenish the feed and fodder banks
Drinking water	Adopt various water conservation methods at village level to improve the ground water level for adequate water supply. Identification of water resources Desilting of ponds Rain water harvesting and create water bodies/watering	Adequate supply of drinking water. Restrict wallowing of animals in water bodies/resources Add alum in stagnated water bodies	Watershed management practices shall be promoted to conserve the rainwater. Bleach (0.1%) drinking water / water sources Provide clean drinking water

	points (when water is scarce use only as drinking water for animals) Construction of drinking water tanks in herding places/village junctions/relief camp locations Community drinking water trough can be arranged in shandies /community grazing areas		
Health and disease management	Procure and stock emergency medicines and vaccines for important endemic diseases of the area All the stock must be immunized for endemic diseases of the area Surveillance and disease monitoring network to be established at Joint Director (Animal Husbandry) office in the district Adequate refreshment training on draught management to be given to VAS, Jr.VAS, LI with regard to health & management measures Procure and stock multivitamins & area specific mineral mixture	Carryout deworming to all animals entering into relief camps Identification and quarantine of sick animals Constitution of Rapid Action Veterinary Force Performing ring vaccination (8 km radius) in case of any outbreak Restricting movement of livestock in case of any epidemic Tick control measures be undertaken to prevent tick borne diseases in animals Rescue of sick and injured animals and their treatment Organize with community, daily lifting of dung from relief camps	Keep close surveillance on disease outbreak. Undertake the vaccination depending on need Keep the animal houses clean and spray disinfectants Farmers should be advised to breed their milch animals during July-September so that the peak milk production does not coincide with mid summer

Floods	In case of early forewarning (EFW), harvest all the crops (paddy/wheat/Sorghum/Bajra,/maize/chickpea/ groundnut/ soya etc.) that can be useful as feed/fodder in future (store properly) Keeping sufficient of dry fodder to transport to the flood affected villages Don't allow the animals for grazing if severe floods are forewarned Keep stock of bleaching powder and lime Carry out Butax spray for control of external parasites Identify the Clinical staff and trained paravets and indent for their services as per schedules Identify the volunteers who can serve in need of emergency Arrangement for transportation of animals from low lying area to safer places and also for rescue animal health workers to get involve in rescue operations	Transportation of animals to elevated areas Proper hygiene and sanitation of the animal shed In severe storms, un-tether or let loose the animals Use of unconventional and locally available cheap feed ingredients for feeding of livestock. Avoid soaked and mould infected feeds / fodders to livestock Emergency outlet establishment for required medicines or feed in each village Spraying of fly repellants in animal sheds	Repair of animal shed Bring back the animals to the shed Cleaning and disinfection of the shed Bleach (0.1%) drinking water / water sources Encouraging farmers to cultivate short-term fodder crops like sunhemp. Deworming with broad spectrum dewormers Proper disposable of the dead animals / carcasses by burning / deep burying (4-8 feet) with lime powder (1kg for small ruminants and 5kg for large ruminants) in pit Drying the harvested crop material and proper storage for use as fodder.
Cyclone	**NA**		
Heat wave	Arrangement for protection from **heat wave** i) Plantation around the shed ii) H_2O sprinklers / foggers in the shed **iii)** Application of white reflector paint on the roof **iv)** Thatched sheds should be provided as a shelter to animal to minimize heat stress	Allow the animals early in the morning or late in the evening for grazing during heat waves Feed green fodder/silage / concentrates during day time and roughages / hay during night time in case of heat waves Put on the foggers / sprinkerlers/fans during heat weaves in case of high yielders (Jersey/HF	Feed the animals as per routine schedule Allow the animals for grazing (normal timings)

		crosses) In severe cases, vitamin 'C' and electrolytes should be added in H_2O during heat waves.	
Cold wave	**NA**		
Insurance	Encouraging insurance of livestock	Listing out the details of the dead animals	Submission for insurance claim and availing insurance benefit Purchase of new productive animals

Vaccination schedule in small ruminants (Sheep & Goat)

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

Vaccination programme for cattle and buffalo:

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

2.5.2 Poultry

	Suggested contingency measures		
	Before the event	**During the event**	**After the event**
Shortage of feed ingredients	Storing of house hold grain like maize, broken rice etc, in to use as feed in case of severe drought	Supplementation only for productive birds with house hold grain Supplementation of shell grit (calcium) for laying birds Culling of weak birds	Supplementation to all survived birds
Drinking water		Use water sanitizers or offer cool hygienic drinking water	
Health and disease management	Culling of sick birds. Deworming and vaccination against RD and IBD	Mixing of Vit. A,D,E, K and B-complex including vit C in drinking water (5ml in one litre water)	Hygienic and sanitation of poultry house Disposal of dead birds by burning / burying with lime powder in pit

Floods			
Shortage of feed ingredients	In case of early forewarning of floods, shift the birds to safer place Storing of house hold grain like maize, broken rice, bajra etc,	Use stored feed as supplement Don't allow for scavenging Culling of weak birds	Routine practices are followed Deworming and vaccination against RD
Drinking water		Use water sanitizers or offer cool hygienic drinking water	
Health and disease management	In case of EFW, add antibiotic powder (Terramycin/Ampicilline/ Ampiclox etc., 10g in one litre) in drinking water to prevent any disease outbreak	Prevent water logging surrounding the sheds through proper drainage facility Assure supply of electricity by generator or solar energy or biogas Sprinkle lime powder to prevent ammonia accumulation due to dampness	Sanitation of poultry house Treatment of affected birds Disposal of dead birds by burning / burying with line powder in pit Disposal of poultry manure to prevent protozoal problem Supplementation of coccidiostats in feed Vaccination against RD
Cyclone	**NA**		
Heat wave			
Shelter/environment management	Provision of proper shelter with good ventilation	In severe cases, foggers/water sprinklers/wetting of hanged gunny bags should be arranged Don't allow for scavenging during mid day	Routine practices are followed
Health and disease management	Deworming and vaccination against RD and fowl pox	Supplementation of house hold grain Provide cool and clean drinking water with electrolytes and vit. C	Routine practices are followed

		In hot summer, add anti-stress probiotics in drinking water or feed	
Cold wave	NA		

[a] based on forewarning wherever available

2.5.3 Fisheries/ Aquaculture

Measures suggested for Drought			
A. Capture Inland			
i) Shallow water depth due to insufficient rains/inflows	1. Proper planning of water storage 2. Conservation & development of water resources by construction of reservoirs & dams. 3. Avoid seepage losses by lining the canals. 4. Adopt rain water harvest techniques. 5. Farmer's organizations, water users & private sectors should be involved in construction, operation & maintenance of irrigation system. 6. To make people aware about conservation of water. 7. Critical analysis of long range a Forecast data. 8. Storage of water. 9. A forestation program. 10. Conservation of rivers/reservoir/ponds. Re-excavation of local canals and reservoirs.	1. Maintenance of dams & reservoirs to avoid leakage & to control theft of water. 2. Proper use of water resources on priority base. 3. Add water in shallow water pond. 4. Use stored water. 5. Use surface water flow. 6. Divert water from unutilized areas. 7. Utilize canal water. 8. Aeration of water in ponds/reservoirs.	1. Regular desiltation of reservoirs & dams. 2. Govt. should make laws on water conservation. 3. To develop demand oriented system. 4. Govt. should make laws to stop deforestation. 5. Need based monitoring through research plan. 6. Intensive forestation program. 7. Augmentation of surface water flow. 8. Strengthening of water reservoirs. 9. Rain water harvesting . 10. Compensation claims. 11. Prepare vulnerability map and place it to management committee
ii) Changes in Water Quality	1. Storage of water disinfectant such as chlorine, alum etc. at district level. 2. Prohibit dumping of solid, liquid and waste in water sources. 3. Preparedness with stocks of chemicals, disinfectants and therapeutic drugs.	1. Provision of water filtration system for the ponds to overcome the water contamination- 2. Use disinfectants and therapeutic drugs. 3. Adoption of bio-remedial	1. Removal of runoff from land by proper means before decomposition. 2. Supply of water filtration system even after the event & creating awareness in farmers.

		measures	3. Need based research data should be generated on water quality. 4. Dumping of solid, liquid and waste in water bodies should be stopped through enactment of legislation.
B. Aquaculture			
i) Shallow water in ponds due to insufficient rains/inflows.	**1.** Available resources will be identified and need to be kept ready for each district on the basis of forecasting of insufficient rain. **2.** To avoid loss due to seepage, infiltration & leakage by using bentonite, ash, polythene liners etc. 3. Maintain the level of water by pumping water into pond. 4. Critical analysis of long range Forecast data. 5. Storage of water. 6. A forestation program. 7. Conservation of rivers/reservoir/ponds. 8. Re-excavation of local canals and reservoirs	1. Water resources of the areas will be exploited with planning of proper transport facilities in affected areas. 2. Maintain the level of water to the required depth. 3. Add stored water in shallow water depth. 4. Harvesting of fishes as early as possible to avoid mortality. 5. Use stored water. 6. Use surface water flow. 7. Divert water from unutilized areas. 8. Utilize canal water. 9. Aeration of ponds.	1. Available resources need to be listed with adequate transport arrangement. 2. Desiltation of pond bottom. 3. Maintenance of tanks & ponds 4. Need based monitoring through research plan. 5. Intensive a forestation program. 6. Augmentation of surface water flow. 7. Construction of water reservoirs. 8. Adoption of rain harvesting methods. 9. Compensation claim. 10. Prepare vulnerability map and place it to management committee
ii) Impact of salt load build up in ponds / change in water quality	1. Minimize evaporation losses. 2. Dilution of water if salt load is high. 3. Available resources will be identified & need to be kept ready for each district on the basis of forecasting of insufficient rain to reduce the salinity by trapping available water resources. 4. On the basis of forecasting advising fish farmers for harvesting of marketable fish. 5. Prohibit dumping of solid, liquid and waste in water sources. 6. Preparedness with stocks of chemicals, disinfectants and therapeutic drugs.	1. Dilution of water or exchange water to avoid salt builds up. 2. Harvesting the marketable fish to reduce the density. 3. Use disinfectants and therapeutic drugs. 4. Adoption of bio-remedial measures	1. Trapping the water resources from other places for dilution to reduce salt load. 2. Need based research data should be generated on water quality. 3. Dumping of solid, liquid and waste should be stopped through enactment of legislation.
2.5.3 Fisheries			
Measures suggested for Flood			
A. Capture Inland			

i) Average compensation paid due to loss of human life	1. Fishermen will be given forewarning regarding heavy rains and advised not to go for fishing in rivers/reservoirs. 2. Areas need to be identified in each district prone for flood. 3. Maintenance of water drainages in proper way to avoid blockage. 4. Proper forecasting information should be available. 5. Be prepared to evacuate at a short notice. 6. Preparation of flood control action plan. 7. Warning dissemination and precautionary response. 8. Formation of flood management committee. 9. Enhancement in coping capabilities of common people. Insurance for the life of people/fishermen.	1. Fishermen will be advised on use of Life saving jackets and life boats. The life saving appliances/machinery shall be kept ready for rescue operation. 2. Sufficient stock of food, medicine etc. should be available. 3. Govt. should take necessary action & provide trained people for rescue operation during flood. 4. Human evacuation from the area. 5. Coordination of assistance. 6. Damage and need assessment. 7. Immediate management of relief supplies. Immediate help delivery	1. The victim's family shall be provided with compensation up to Rs. 1, 00,000/- for the deaths occurring during the fishing. 2. Rehabilitation of people. 3. Identify the causes of flood affected area & take necessary preventive measures. 4. Arrangement for rescue and casualty care. 5. Arrangement for burial control room. 6. Restoration of essential services, security and protection of property. 7. Support to rehabilitation, logistics, training and awareness build up & testing and updating the plan. Insurance and compensation claim.
ii) No. of boats / nets damaged	1. The prior information on safe keeping of boats and nets will be provided to the fishermen. 2. If prior information is given bring boats & nets towards the safer side. 3. Annual repair of boats/nets and gears. Insurance of boats/nets/gears.	1. Fishermen will be advised to stop fishing during the floods and heavy rainfall. 2. Continuous monitoring on water level is required. 3. Coordination of assistance 4. Immediate management of relief supplies. Govt. support and compensation.	1. The affected fishermen will provided with compensation up to Rs. 50,000/- for damaged boats or nets. 2. Education and training for the repair of boats/nets and gears. Loss assessment & insurance claim.
iii) No. of houses damaged	1. Forewarning regarding heavy rainfall, sudden downpour and floods will be spread in the fishermen villages on the banks of rivers. 2. Shift the people to safer places. 3. Proper maintenance of *Kaccha* houses. 4. Education and training for the repair of houses	1. Temporary shelter to the affected families will be provided. 2. Arrangement of temporary shelters for homeless people. 3. Damaged house enumeration and need assessment.	1. The housing facilities on higher elevation shall be provided to affected families by the Government agencies. 2. Provide compensation from Govt. to build/repair houses. 3. Loss assessment & insurance

	5. Store raw material for emergency repair of houses. 6. House insurance.	4. Coordination of assistance. Immediate management of relief supplies.	claim. 4. Govt. assistance claim.
iv) Loss of stock	1. Harvesting the existing fish stock 2. Keep boats, nets/gears ready for emergency use. 3. Store fuels, food/other item 4. Develop flood control management plans. .Stock material insurance	1. Search/locate the stock/input. 2. Mobilize local people for protection. 3. Hire stock/inputs from distant areas/company/ farmers who are not affected by flood.	Provided subsidy on seeds by Govt. 1. Implementation of Insurance policy. 2. Locate backup stocks and verify its usability time. 3. Follow flood control management plan. 4. Notify utilities of the critical demand about loss of stock and inputs. Loss assessment & insurance claim.
v) Changes in water quality	1.Storage of water disinfectant such as chlorine, alum etc. at district level. 2. Provision to stop/close the effluent/sewerage discharge point in water bodies 3. Store chemicals, disinfectants and therapeutic drugs. 4. Develop flood control management plan.	.Provision of water filtration system for the ponds to overcome the water contamination- 2. Do not use contaminated water 3. Proper preparation and management through emergency aeration. 4. Use appropriate amount of disinfectants, chemicals and therapeutic drugs. 5. Immediate support of Govt./industrial organizations for maintaining the purity and quality of water bodies. 6. Need based bioremediation	1.Removal of runoff from land by proper means before decomposition. 2.Supply of water filtration system even after the event & creating awareness in farmers. 3. Need based research data should be generated to maintain water quality, 4. Dumping of solid, liquid and waste should be stopped through enactment of legislation. 5. Contact Govt. and industrial organization for immediate remedy and cleaning of the water bodies. 6. Regular water monitoring and bio-monitoring of water bodies for formulation of management plan
vi) Health and diseases	1.Water filtration system & control measures for diseases should be available. 2. Advance planning and preparedness. 3. Store chemicals, disinfectants and therapeutic drugs. 4. Stock sufficient stores of medicines.	1. 1.Periodical checking particularly with respective fish mortality should be done during flood & dead fishes disposed properly. 2. Prompt action or immediate	1.Setting health & disease management training centre at district level for fisherman community by Govt. or with the help of NGO. 2. Laboratory diagnosis of diseased

		removal of disease causing agents/ dead fish, followed by sterile or landfill disposal. 3. Use appropriate amount of disinfectants, chemicals and therapeutic drugs. 4. 4. Emergency aeration or splashing in water bodies.	fish, generation of data about type or kind of disease spread. 3. Eradicating the disease where possible. 4. Follow up surveillance and monitoring after disease outbreak. 5. Need based research data should be generated. 6. Loss assessment & insurance claim.
B. Aquaculture			
i) Inundation with flood water	1) In the flood prone areas proper draining system from ponds need to be developed and planned in flood situation before forecasting of flood. 2) Site should be away from flood prone area. 3) Dyke should be stable in all weather condition & not liable to collapse during heavy rains. 4) Proper channels to be provided to pass surplus water & to avoid breakage to the bundh. 5) Proper facility construction for ponds and its stock safety. 6) Development of flood control management plan. 7) Preparedness with emergency backup equipment on site. 8) Stock insurance. 9) Preventive measures against entry of alien/wild organisms through flood water.	2. On the basis of forecasting information to farmers for sale of marketable fish with sufficient transport facility through various media. Proper drainage should be adopted so that inundation with flood water should be minimized. 3. On the basis of forecasting, information to farmers for sale of marketable fish with sufficient transport facility through various media. 4. Proper drainage should be adopted so that inundation with flood water should be minimized. Excess water should be drained from pond by providing screen outlets or using pumps. 5. Arrangement for evacuation. 6. Arrangement for rescue and casualty care. 7. Arrangement for burial control room. 8. Restoration of essential services, security and protection of property. 9. Coordination of assistance.	Planning even after the event should be made for proper drainage and creating awareness and trainings in flood situations. 2). Pinning even after the event should be made for proper drainage & creating awareness & training in flood situation. 3) Support to rehabilitation, logistics, training and awareness build up & testing and updating the plan 4) Reallocate fish to maintain appropriate biomass so that waste assimilation capacity of pond is not exceeded. 5) Reduce or cease feeding because uneaten food and fish waste decreases the dissolved oxygen level. 6) Strengthening of water bodies/ponds. 7) Loss assessment & insurance claim.

		10. Damage and need assessment. 11. Immediate management of relief supplies. 12. Release excess water from height of T. Lower the water level in culture facilities.	
ii) Water contamination and changes in water quality	1. Availability of water purifier i.e., chlorine, alum etc at district level. 2. Availability of water disinfectant such as chlorine, alum etc at district level. 3. Use of calcium hydroxide @ 150 kg/ha 4. Store chemicals, disinfectants and therapeutic drugs 5. Develop flood control management plan	1). Supply of water purifier for the ponds to overcome the contamination and changes in BOD. 2). Supply of water filtration system for ponds to overcome the contamination. Use of $kmno_4$ for bath of fish as prophylactics 3) . Do not use contaminated water. 4) Proper preparation and management through emergency aeration (paddle wheel aerator/circulating aerator), that may improve water quality in affected areas. 5) Use appropriate amount of disinfectants, chemicals and therapeutic drugs. 6) Maintaining the purity and quality of water bodies. 7) Need based bioremediation	1). Supply of water purifier even after the event and creating awareness in farmers. 2). Supply of water filtration system even after the event & crating awareness in farmers. 3). Lime treatment for oxidation 4). To maintain water quality, need based research data should be generated 5). Dumping of solid, liquid and waste should be stopped through enactment of legislation. 6). Immediate remedy and cleaning of water bodies. 7). Regular water monitoring and bio-monitoring of water bodies for formulation of management plan.
iii) Health and diseases	1. Storage of water purifiers and control measures for diseases should be available. 2. Personnel should be trained for health & disease management through training 3. & list of trained personnel should be available at each district level. 4. Adequate stock of medicine should be available at each district level. 5. Antibiotics fortified feeding as prophylactics 6. Advance planning and preparedness. 7. Store chemicals, disinfectants and therapeutic	1. Periodical checking particularly with respective fish mortality should be done during flood. 2. Services of trained personnel need to be made available in affected areas with sufficient supply of life saving medicines. 3. Disinfectants formalin treatments as prophylactics 4. Identification of type of disease outbreak, immediate removal of	1). Setting health and disease management training centre at district level for fishermen and government officials. 2). Routine training programmed as a refresher course need to be implemented in relation to health & disease management during flood. 3) .Lime treatment for oxidation 4). Laboratory diagnosis of diseased

	drugs. Stock sufficient emergency medicines	disease causing agents/ dead fish. 5. Use appropriate amount of disinfectants, chemicals and therapeutic drugs. 6. Determination of nature and speed of transmission of diseases. 7. Emergency aeration or splashing in water bodies.	fish, generation of data about type or kind of disease spread. 5). Eradicating the disease. 6). Follow up surveillance and monitoring. 7). Proper disposal of dead fish. 8). Loss assessment & insurance claim.
iv) Loss of stock and inputs (feed chemicals etc.)	1). Harvestable sized fishes shall be marketed before the event to avoid losses. The inputs like feed and chemical etc. shall be stored at safe places. 2).Flood situation going to exist then move the feed, chemicals & other accessories to safer places. 3). Keep the stock/input at safe place for emergency purpose. 4). Store fuels, food/other item. 5) .Develop flood control management plan. 6). Stock material insurance	1).The pond embankments will be fenced with netting to avoid fish losses. The store rooms for inputs like feed, chemicals etc. shall be created. 2).Available fish stock should be recovered. Stock of inputs must be stored in well protected area. 3). Search/locate the stock/input. 4). Purchase/hire valuable stock/inputs from distant areas not affected by flood.	1) The fish farmers shall be provided with fish seed and feed at concessional rates. 2) Feeds, chemicals etc required for the culture operation should be purchased. 3) Strengthening of stocks. 4) Assessment of total loss. 5) Insurance claims.
v) Infrastructure damage (pumps, aerators, huts etc.)	1) Prior information regarding removal of Pumps and aerators shall be given to the fish farmers. 2) Flood situation going to exist then move the pumps, aerators & other accessories to safer places. 3) Educate and provide training for the repair of infrastructure. 4) Follow flood control management plan. 5) Store raw materials for repairing of pumps aerators, huts etc. 6) Infrastructure insurance.	1) Pumps, aerator and generators shall be removed from the pond before the event. 2) Use manual techniques for aeration or make substitute arrangement for the same. 3) Notify utilities of the critical demand. 4) Coordination of assistance. 5) Immediate management of relief supplies	1. Suitable Compensation for the damaged machinery shall be given to the fish farmers. 2. Install the equipments during flood. 3. Damaged infrastructure enumeration and need assessment. 4. Locate backup equipment and verify its operation. 5. Repair of damaged infrastructure. 6. Loss assessment & insurance claim.
2.5.3 Fisheries			
Measures suggested for Cyclone			
Inland Aquaculture			

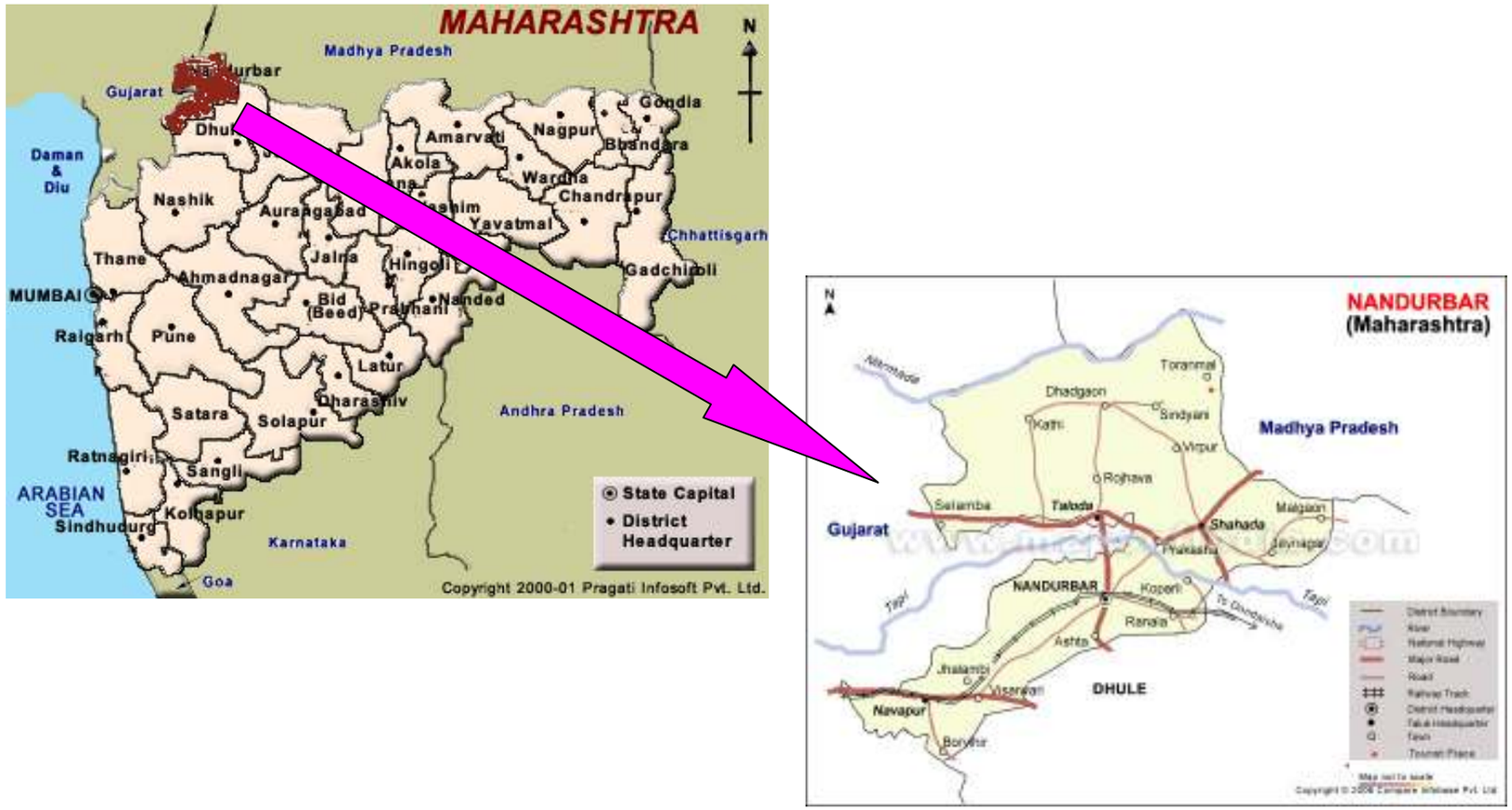
i) Overflow/flooding of ponds	1. If intensity of cyclone with heavy rain fall exists then harvest existing fish stock. 2. Dike should be stable in all weather condition & not liable to collapse during flood.	1. On the basis of forecasting information to farmers for sale of marketable fish with sufficient transport facility through various media. Proper drainage should be adopted so that inundation with storm water should be managed 2. Enhancement of dykes height by sand bags	Planning even after the event should be made for proper drainage & creating awareness & training in storm situation.
i) Changes in water quality (fresh/brackish water ratio)	1. Supply of water for correcting the changes in fresh water & brackish water. 2.Maintain salinity by addition of fresh water up to 20-25 ppt.	1. Supply of water for correcting the changes in fresh water & brackish water. 2. Use euryhaline species	1.Water storage facility needs to be developed to overcome the problem of changes in fresh & brackish water ratio. 2. Use Euryhaline species for culture
iii) Health and disease	1. Water filtration system & control measures for disease should be available. 2. Adequate stock of medicine should be available at each district level. 3. Liming and formalin treatment	1. Periodically checking particularly in respective of fish mortality & water parameter during flood. 2. Disinfectants treatments	1. Settling health & disease management training centre at district level for fishermen & Govt. official.

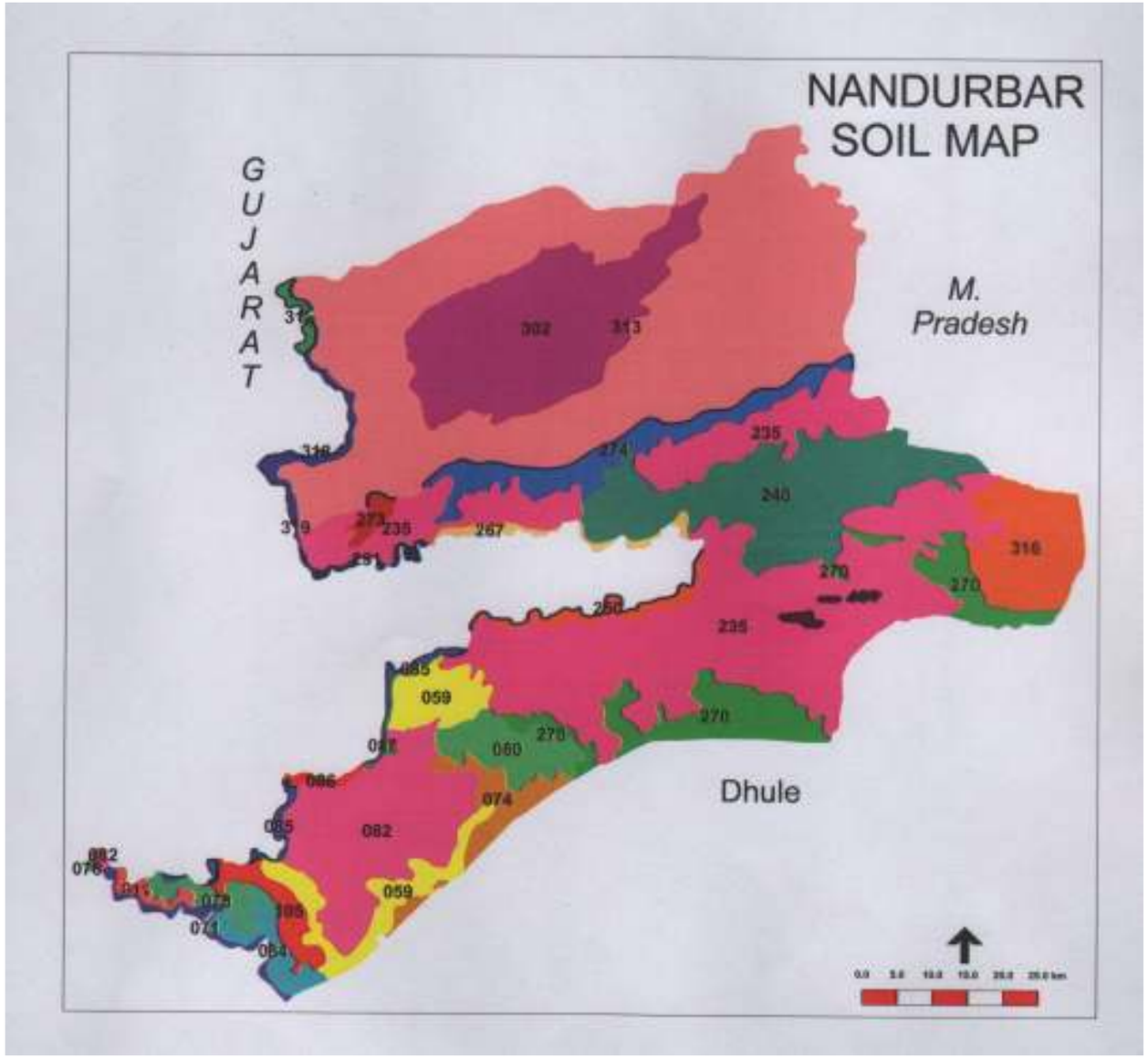
iv) Loss of stock and inputs (feed, chemicals etc.)	1. Cyclone with heavy rain fall situation going to exist then move the feed, chemicals & other accessories to safer places. Stock cover under insurance	1. Available fish stock should be recovered.	1. Feeds, chemicals etc required for the culture operation should be purchased. Seed and feed to be supplied through Deptt of fisheries,
v) Infrastructure damage (pumps, aerators, shelters/huts etc)	1) Cyclone with heavy rain fall situation going to exist then shifted the pumps, aerators & other accessories to safer places.	1) Use manual techniques for aeration or make substitute arrangement for the same.	1) Compensation on assessment of actual losses & damage of pumps, aerators, shelters/huts given through RKVY, NCDC, NREGSui
2.5.3 Fisheries			
Measures suggested for Heat Wave and Cold Wave			
Inland			
Aquaculture			
i) Changes in pond environment (water quality)	1)If intensity of heat wave high, add water from other source.	1) Adequate facility should be ready for heat wave & system for	1)Adequate facility should be ready for heat wave & system for changing

	2)Harvest existing fish stock. 3)Adequate facility should be ready for heat wave & system for changing water temperature during cold wave. 4)Listen to local weather forecasts and stay aware of upcoming temperature changes. 5) Arrange the aerators. 6) Ensure sufficient water quantity in water bodies. 7)Formulate strategic fishing management for the heat /cold waves. 8) Tree plantation around fish ponds	changing water temperature during cold wave. 2) Monitor fishing sites frequently to ensure that they are not affected by heat or cold waves. 3) Use dark materials to cover the water bodies during excessive heat waves. 4) Stay hydrated by drinking plenty of fluids during fishing/field work. 5) Adopt proper care and management during the fishing period of cold/heat wave like keeping stock of drinking water and extra cloths. 6) Educating the farmers through electronic or print media 7) Maintain Water level in pond	water temperature during cold wave. 2) Intensive afforestation program for reducing heat waves. 3) Collect basic weather data and incidence of extreme and physical data of water bodies, water chemistry and seasonal changes, plankton profile and seasonal blooms, topography and soil composition. 4) Gather information about history of catch per unit effort as well as fish yield rate during heat wave and cold wave and accordingly simulate future plan for sustainable fishing. 5) Loss assessment & insurance claim.
ii) Health and diseases management	1) Adequate stock of medicine should be available at each district level. 2) Advance planning and preparedness. 3) Store chemicals, disinfectants and therapeutic drugs. 4) Develop heat/ cold wave control management plan. 5) Stock sufficient emergency medicines.	1)Periodical checking particularly with respective fish mortality should be done. 2)Identification of type of disease outbreak, immediate removal of disease causing agents/ dead fish. 3) Use appropriate amount of disinfectants, chemicals and therapeutic drugs. 4) Determination of nature and speed of transmission of diseases. 5)Emergency aeration or splashing in water bodies 6)Bleaching powder 1 to 2 % , formalin treatment to prevent disease	1)Setting health & disease management training centre at district level for fishermen & Govt. official. 2) Laboratory diagnosis of diseased fish, generation of data about type or kind of disease spread. 3) Eradicating the disease. 4) Follow up surveillance and monitoring. 5) Proper disposal of dead fish. 6) Loss assessment & insurance claim. 7)KMNO4 2 % to maintain oxygen level

Annexure-I

Map of Nandurbar District




NANDURBAR
SOIL MAP
GUJARAT
M.
Pradesh
Dhule