

**State: MAHARASHTRA**

**Agriculture Contingency Plan for District: KOLHAPUR**

<b>1.0 District Agriculture Profile</b>					
<b>1.1</b>	<b>Agro-Climatic/Ecological Zone</b>				
	Agro Ecological Sub Region (ICAR)	North Sahyadris and Western Karnataka plateau, hot dry sub-humid eco-subregion (6.4)			
	Agro-Climatic Region (Planning Commission)	West Coast Plains and Ghat Region (XII), Western Plateau And Hills Region(IX)			
	Agro Climatic Zone (NARP):	South Konkan Coastal Zone (MH-1)			
	List all the districts or part thereof falling under the NARP Zone	Sub Mountain Zone : Kolhapur, Satara, Sangli, Pune, Nashik Western Ghat Zone: Kolhapur, Nandurbar, Nashik, Pune, Satara			
	Geographic coordinates of district headquarters	Longitude		Altitude	
		16 <sup>0</sup> 42' 17.24" N	74 <sup>0</sup> 14' 10.74" E	605 m	
	Name and address of the concerned ZRS/ ZARS/ RARS/ RRS/ RRTTS	Zonal Agricultural Research Station, Shenda Park, Kolhapur 4160012 Phone- 0231/2692416 fax 0231/2693017 email <a href="mailto:adrkolhapur@rediffmail.com">adrkolhapur@rediffmail.com</a> <a href="mailto:adrkolhapur@yahoo.com">adrkolhapur@yahoo.com</a>			
Mention the KVK located in the district	KVK Talsande, Tal. Hatkanangale, Dist. Kolhapur. Pin. 416112 Phone- 0230/2479099 Mob. 9960430979 Email <a href="mailto:kvkkolhapur@gmail.com">kvkkolhapur@gmail.com</a> kvkkolhapur@rediffmail.com				
<b>1.2</b>	<b>Rainfall</b>	<b>Normal RF(mm)</b>	<b>Normal Rainy days (number)</b>	<b>Normal Onset</b>	<b>Normal Cessation</b>
	SW monsoon (June-Sep):	809.0	54	2 <sup>nd</sup> Week of June	2 <sup>nd</sup> Week of Oct
	NE Monsoon(Oct-Dec):	137.7	8	-	-
	Winter (Jan- Feb)	7.6	--	-	-
	Summer (Mar - May)	65.2	3	-	-
	Annual	1019.5	65	-	-

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
	<b>Area ('000 ha)</b>	776.3	427	147.20	36.4	41.6	36.4	6.4	44.1	12.6	24.6

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

<b>1.4</b>	<b>Major Soils</b>	<b>Area (000ha)</b>
	Shallow laterite soils	172.4
	Deep brownish soils	151.5
	Medium deep black soils	102.9

(Source: NBSS & LUP, Nagpur)

<b>1.5</b>	<b>Agricultural land use</b>	<b>Area ('000 ha)</b>	<b>Cropping intensity %</b>	
	Net sown area	414.4	176.93	
	Area sown more than once	318.8		
	Gross cropped area	733.2		
<b>1.6</b>	<b>Irrigation</b>	<b>Area ('000 ha)</b>		
	Net irrigated area	128.0		
	Gross irrigated area	135.0		
	Rainfed area	298.9		
	<b>Sources of Irrigation</b>	<b>Number</b>	<b>Area ('000 ha)</b>	<b>Percentage of total irrigated area</b>
	Canals	--	--	--
	Tanks	104	3.7	2.9
	Open wells	17045	37.3	29.1
	Bore wells	4959	4.2	3.3
	Lift irrigation schemes	19605	74.0	57.8

Micro-irrigation			
Other sources (please specify)	3581	8.6	6.7
Total Irrigated Area	41608	128.0	100
Pump sets	31000		
No. of Tractors	6000		
<b>Groundwater availability and use* (Data source: State/Central Ground water Department /Board)</b>	<b>No. of blocks/ Tehsils</b>	<b>(%) area</b>	<b>Quality of water (specify the problem such as high levels of arsenic, fluoride, saline etc)</b>
Over exploited			
Critical			
Semi- critical			
Safe		65% of ground water exploited	
Wastewater availability and use			
Ground water quality			

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

1.7	Major field crops cultivated	Area ('000 ha)							
		<i>Kharif</i>			<i>Rabi</i>			Summer	Grand total
		Irrigated	Rainfed	Total	Irrigated	Rainfed	Total		
Sugarcane	--	--	--	113.9	--	113.9	--	113.9	
Paddy -Rainfed	--	113.8	113.8	--	--	--	-	113.8	
Groundnut	57.4	--	57.4	--	--	--	--	57.4	
Soybean	57.3	--	57.3	--	--	--	--	57.3	
Finger millet	--	23.3	23.3	--	--	--	-	23.3	
Sorghum	--	8.7	8.7	--	12.7	12.7	--	21.4	
Maize	--	2.8	2.8	7.4	--	7.4	-	10.2	
Chickpea	--	--	--	--	10.1	10.1	--	10.1	
Wheat	--	--	--	9.6	--	9.6	--	9.6	

	<b>Horticulture crops - Fruits</b>	<b>Area ('000 ha)</b>
		<b>Total</b>
	Mango	15.6
	Cashew	16.8
	Coconut	0.7
	Sapota	2.0
	Banana	0.5
	Grape	0.05
	<b>Horticulture crops - Vegetables</b>	<b>Total</b>
	Tomato	1.7
	Cauliflower	2.3
	Cabbage	0.6
	Onion	0.5
	Potato	0.6
	Chilli	3.2
	Garlic	0.2
	Turmeric	0.9

<b>1.8</b>	<b>Livestock</b>	<b>Male('000)</b>	<b>Female ('000)</b>	<b>Total ('000)</b>
	Non descriptive Cattle (local low yielding)	108.6	4.4	113.1
	Crossbred cattle	11.3	99.4	110.8
	Non descriptive Buffaloes (local low yielding)	47.5	569.1	616.7
	Graded Buffaloes	4.5	43.3	47.9
	Goat	41.5	131.7	173.2
	Sheep	29.9	137.9	167.8
	Others (Camel, Pig, Yak etc.)			
	Commercial dairy farms (Number)			
<b>1.9</b>	<b>Poultry</b>	<b>No. of farms</b>	<b>Total No. of birds ('000)</b>	
	Commercial	0	387.2	

	Backyard		0		871.3		
<b>1.10</b>	<b>Fisheries</b> (Data source: Chief Planning Officer)						
	<b>A. Capture</b>						
	i) <b>Marine</b> (Data Source: Fisheries Department)	<b>No. of fishermen</b>	<b>Boats</b>		<b>Nets</b>		<b>Storage facilities (Ice plants etc.)</b>
			Mechanized	Non-mechanized	Mechanized (Trawl nets, Gill nets)	Non-mechanized (Shore Seines, Stake & trap nets)	
		NA	NA	NA	NA	NA	NA
	ii) <b>Inland</b> (Data Source: Fisheries Department)	<b>No. Farmer owned ponds</b>		<b>No. of Reservoirs</b>		<b>No. of village tanks</b>	
		0		55		350	
	<b>B. Culture</b>						
			<b>Water Spread Area (ha)</b>		<b>Yield (t/ha)</b>		<b>Production tons</b>
	i) <b>Brackish water</b> (Data Source: MPEDA/ Fisheries Department)		NA		NA		NA
ii) <b>Fresh water</b> (Data Source: Fisheries Department)		7492		0.31		2325	
<b>Others</b>		NA		NA		NA	

**1.11 Production and Productivity of major crops (Average of last 5 years: 2004, 05, 06, 07, 08, 09)**

1.11	Name of crop	<i>Kharif</i>		<i>Rabi</i>		Summer		Total		Crop residue as fodder ('000 tons)
		Production ('000 t)	Productivity (kg/ha)							
<b>Major Field crops (Crops to be identified based on total acreage)</b>										
	Sugarcane	--	--	8.9	74.7	--	--	8.9	74.75	
	Paddy- Rainfed	283.1	2551.8	-	-	--	--	283.1	2551.8	--
	Groundnut	84.6	1397.4	-	-	--	--	84.6	1397.4	--
	<i>Kharif</i> Sorghum	14.2	1695	19.3	1648	--	---	33.6	1671.5	--
	Fingermillet	31.7	1351.4	-	-	--	--	31.7	1351.4	--

	Soybean	430.6	1528	-	-	--	--	430.6	1528	--
	Maize	13.5	2036	-	-	--	--	13.5	2036	--
	Chickpea	--	--	8.68	907	--	--	8.6	907	
	Wheat	--	--	20.5	2257.2	--	--	20.5	2257.2	
<b>Major Horticultural crops- Fruits (Crops to be identified based on total acreage)</b>										
	Mango	50.3	3400	--	--	--	--	50.31	3400	--
	Cashew	33.7	2600	--	--	--	--	33.73	2600	--
	Coconut	60.7 lakh nuts	7975	--	--	--	--	60.7 lakh nuts	7975	--
	Sapota	1.6	8000	--	--	--	--	1.6	8000	--
	Banana	3.0	60000	--	--	--	--	3.0	60000	--
	Grape	0.1	23.6	--	--	--	--	0.1	23.6	--
<b>Horticultural Crops-Vegetables</b>										
	Tomato	3.7	21.4	--	--	--	--	3.7	21.4	--
	Cauliflower	3.4	15.0	--	--	--	--	3.4	15.0	--
	Cabbage	1.7	25.0	--	--	--	--	1.7	25.0	--
	Onion	0.7	12.0	--	--	--	--	0.7	12.0	--
	Potato	0.6	10.1	--	--	--	--	0.6	10.1	--
	Sweet Potato	2.7	12.0	--	--	--	--	2.7	12.0	--
	<b>Spices</b>			--	--	--	--	--		--
	Chilli	0.6	2.0	--	--	--	--	0.6	2.0	
	Garlic	0.2	10.0	--	--	--	--	0.2	10.0	--
	Turmeric	0.1	15.0	--	--	--	--	0.1	15.0	--
<b>Medicinal and Aromatic crops</b>										
<b>Plantation crops</b>										

Source: Kolhapur District Superintending Agricultural Officer Reports 2008-09

<b>1.12</b>	<b>Sowing window for 5 major crops (start &amp; end of sowing period)</b>	Sugarcane	Paddy	Finger millet	Soybean	<i>Kharif</i> Sorghum	Groundnut
	<i>Kharif</i> -Rainfed	-	3 <sup>rd</sup> week of May to 1 <sup>st</sup> week of June	1 <sup>st</sup> of June to 2 <sup>nd</sup> week of July	1 <sup>st</sup> week of June to 1 <sup>st</sup> week of July	2 <sup>nd</sup> week of June to 1 <sup>st</sup> week of July	2 <sup>nd</sup> week of June to 2 <sup>nd</sup> week of July
	<i>Kharif</i> -Irrigated	--	3 <sup>rd</sup> week of May to 1 <sup>st</sup> week of June	-	4 <sup>th</sup> week of May to 1 <sup>st</sup> week of July	2 <sup>nd</sup> week of June to End of June	--
	<i>Rabi</i> -Rainfed	-		-	-	-	-
	<i>Rabi</i> -Irrigated	Preseasonal(15 <sup>th</sup> Oct to 15 <sup>th</sup> Nov) and suru (15 <sup>th</sup> Dec to 15 <sup>th</sup> Feb)	Wheat 1 <sup>st</sup> fortnight of October to 1 <sup>st</sup> Fortnight of Nov	Chickpea 20 <sup>th</sup> Oct to 10 <sup>th</sup> Nov	-	--	--

<b>1.13</b>	<b>What is the major contingency the district is prone to?</b>	Regular	Occasional	None
	Drought		Long dryspells of 15 to 20 days in kharif	✓
	Flood	-	✓	-
	Cyclone	-	-	✓
	Hail storm	-	-	✓
	Heat wave	-	-	✓
	Cold wave	-	-	✓
	Frost	-	-	✓
	Sea water intrusion	-	-	✓
Pests and disease outbreak	-	✓	-	

<b>1.14</b>	<b>Include Digital maps of the district for</b>	Location map of district within State as Annexure I	Enclosed: Yes
		Mean annual rainfall as Annexure II	Enclosed: Yes
		Soil map as Annexure III	Enclosed: Yes

## 2.0 Strategies for weather related contingencies

### 2.1 Drought

#### 2.1.1 Rainfed situation

Condition	Major Farming Situation	Crop/cropping system	Suggested Contingency measures			
			Change in crop/cropping system	Agronomic measures	Remarks on Implementation	
Early season drought (delayed onset)						
Delay by 2 weeks  June 4 <sup>th</sup> week	Shallow lateritic soils	Finger millet (GPU -28, Dapoli -1, RAU-8)	No change	Hoeing at 25 DAS, dust mulch by blade harrow	Seed Source: Linkage with MPKV, Rahuri, College of Agriculture Kolhapur NSC and MSSC.	
	Medium deep black soils	Paddy- Rainfed,(Jaya Karjat 184, Karjat 4, Indrayani,R-24, Bhogawati, Phule Radha,R-1)	-do-			dry seeding
		Groundnut (Jl-24,JL-501,JL-286, TMV-10)	No change			Hoeing at 25 DAS and Weeding
		Finger Millet (GPU- 26,GPU 45),	No change			Prefer transplanting with the seedlings available from the existing nurseries
		Sorghum(CSH-5,9,11)	No change			Hoeing at 25 DAS, protective irrigation
		Soyabean (JS-335, DS-228)	No change			Hoeing at 25 DAS, protective irrigation
	Deep brownish soils	Paddy (Indrayani, Bhogawati, R1, R 24, Samrudhi, Jaya)	No change			Prefer transplanting with the seedlings available from the existing nurseries
		Groundnut (Jl-24,JL-501,JL-286, TMV-10)	No change			Increase spacing 45x15 cm, hoeing by two tyned hoe at 30DAS)
		Finger Millet (GPU- 26,GPU 45),	No change			Increase spacing (30x10 cm), hoeing/ soil mulch
		Sorghum (CSH-5,9,11)	No change			Hoeing at 25 DAS
		Soybean (JS-335, DS-228)	No change			Hoeing at 25 DAS

Condition			Suggested Contingency measures		
Early season drought (delayed onset)	Major Farming Situation	Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Delay by 4 weeks	Shallow laterite soils	Finger millet (GPU -28, Dapoli -1, RAU-8)	No change	Hoeing at 25 DAS, dust mulch by blade harrow	Linkage with MPKV, Rahuri, College of Agriculture Kolhapur NSC and MSSC..
	July 2 <sup>nd</sup> week	Medium deep black soils	Paddy- Rainfed,(Jaya Karjat 184, Karjat 4 Indrayani,R-24, Bhogawati, Phule Radha,R-1))	-do-	
Groundnut (Jl-24,JL-501,JL-286, TMV-10)			No change	Hoeing at 25 DAS and Weeding	
Finger Millet (GPU- 26,GPU 45),			No change	Prefer transplanting with the seedlings available from the existing nurseries	
Sorghum(CSH-5,9,11)			No change	Hoeing at 25 DAS, protective irrigation	
Soyabean (JS-335, DS-228)			No change	Hoeing at 25 DAS, protective irrigation	
Deep brownish soils			Paddy- Rainfed (Indrayani, Bhogawati, R1, R 24, Samrudhi, Jaya)	No change	
		Groundnut (Jl-24,JL-501,JL-286, TMV-10)	No change	Increase spacing 45x15 cm, hoeing by two tyned hoe at 30DAS)	
		Finger Millet (GPU-26,GPU 45),	No change	Increase spacing (30x10 cm), hoeing/ soil mulch	
	Sorghum (CSH-5,9,11)	No change	Hoeing at 25 DAS		
		Soybean (JS-335, DS-228)	No change	Hoeing at 25 DAS	

Condition			Suggested Contingency measures		
Early season	Major Farming Situation	Crop/cropping system	Change in	Agronomic measures	Remarks on

drought (delayed onset)			crop/cropping system		Implementation
Delay by 6 weeks  July 4 <sup>th</sup> week	Shallow laterite soils	Finger millet (GPU -28, Dapoli -1, RAU-8)	No change	Hoeing at 25 DAS, dust mulch by blade harrow	Linkage with MPKV, Rahuri, College of Agriculture Kolhapur NSC and MSSC..
	Medium deep black soils	Paddy -Rainfed (Halva, RDN 185-2, EK 70, Halvisal, Pawana, local)	No change	Prefer 5 to 6 seedlings/ hill ,	
		Groundnut	Finger Millet (GPU 28, Dapoli 1, KOPN 235 local)	Prefer transplanting with the seedlings available from the existing nurseries	
		sorghum	Fodder Maize (African tall, Pachganga, Ganga safed 2, Vijay, local)	Sowing at 30 cm spacing, apply 100:50:50 kg NPK/ha, harvest at 50% flowering (65-70 days) as fodder	
		Finger Millet (GPU 26, GPU45, local)	No change	Increase spacing (30x10 cm).	
		Soybean	Fodder Maize (African tall, Pachganga, Ganga safed 2, Vijay, local)	Sowing at 30 cm spacing, apply 100:50:50 kg NPK/ha, harvest at 50% flowering (65-70 days) as fodder	
		Deep brownish soils	Paddy- Rainfed (Indrayani, Bhogawati, R1, R24, Samrudhi, Jaya)	No change	
	Groundnut		Finger Millet, (GPU 28, Dapoli 1, KOPN 235 local)	Prefer transplanting with the seedlings available from the existing nurseries	
	Sorghum		Fodder Maize (African tall, Pachganga, Ganga safed 2, Vijay, local)	Sowing at 30 cm spacing, apply 100:50:50 kg NPK/ha, harvest at 50% flowering (65-70 days) as fodder	
	Finger Millet(GPU 28, Dapoli 1, KOPN 235 local)		No change	Prefer transplanting with the seedlings available from the existing nurseries	

		Soyabean	Fodder Maize (African tall, Pachganga, Ganga safed 2, Vijay, local)	Sowing at 30 cm spacing, apply 100:50:50 kg NPK/ha, harvest at 50% flowering (65-70 days) as fodder	
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Condition			Suggested Contingency measures		
Early season drought (delayed onset)	Major Farming Situation	Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Delay by 8 weeks 2 <sup>nd</sup> week of August			NA		

Condition			Suggested Contingency measures		
Early season drought (Normal onset)	Major Farming Situation	Crop/cropping system	Crop management	Soil nutrient and 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 laterite soils	Finger millet	Resowing / Gap filling	Hoeing at 25 DAS, weeding	Linkage with MPKV, Rahuri, College of Agriculture Kolhapur NSC and MSSC..
	Medium deep black soils	Paddy -Rainfed	Gap filling / Resowing	Hoeing	
		Groundnut	Gap filling / Resowing	Hoeing/earthing up	
		sorghum	Resowing with early hybrids (CSH1,CSH5, CSH18)	Delay top dressing of N hoeing at 25 DAS weeding	
		Finger millet	Resowing / Gap filling	Hoeing at 25 DAS, weeding	
	Deep brownish soils	Soybean	As above	Hoeing at 25 DAS, weeding	
		Paddy- Rainfed	As above	Hoeing	
		Groundnut	Gap filling/ Resowing	Hoeing / earthing up at 40 DAs	
		sorghum	Resowing with early hybrids (CSH1,CSH5, CSH18)	Delay top dressing of N hoeing at 25 DAS weeding	
		Finger Millet	Resowing / Gap filling	Hoeing at 25 DAS, weeding	
Soyabean		As above	Hoeing at 25 DAS, weeding		

Condition			Suggested Contingency measures		
Mid season drought (long dry spell,	Major Farming Situation	Crop/cropping system	Crop management	Soil nutrient and moisture conservation measures	Remarks on Implementation

<b>At vegetative stage</b>	Shallow laterite soils	Finger millet	Reduce plant population	Reduce 2 <sup>nd</sup> N Dose by 25% hoeing/weeding/	
	Medium deep black soils	Paddy- Rainfed	Protective irrigation	Hoeing/weeding	
		Groundnut	As above	As above	
		Sorghum	Protective irrigation,	Hoeing/weeding	
		Fingermillet	--	Hoeing/weeding	
		Soyabean	Protective irrigation,	-do-	
	Deep brownish soils	Paddy- Rainfed	As above	-do-	
		Groundnut	As above	-do-	
		Sorghum	As above	-do-	
		Finger Millet	--	-do-	
Soybean		Protective Irrigation	-do-		

<b>Condition</b>	<b>Major Farming Situation</b>	<b>Crop/cropping system</b>	<b>Suggested Contingency measures</b>		
			<b>Crop management</b>	<b>Soil nutrient and moisture conservation measures</b>	<b>Remarks on Implementation</b>
<b>Mid season drought (long dry spell)</b>					
<b>At reproductive stage</b>	Shallow laterite soils	Fingermillet	—	--	
	Medium deep black soils	Paddy- Rainfed	Protective irrigation,	--	
		Fingermillet	--	--	
		<i>Khariif</i> sorghum	Spray 8% Kaoline, Protective irrigation	--	
		Groundnut	As above	--	
		Soybean	As above	--	
	Deep brownish soils	Paddy- Rainfed	--	--	
		Fingermillet	--	--	
		sorghum	Spray 8% Kaoline, Protective irrigation	--	
		Groundnut	As above	--	
		Soybean	As above	--	

<b>Condition</b>	<b>Major Farming</b>	<b>Crop/cropping</b>	<b>Suggested Contingency measures</b>		
			<b>Crop management</b>	<b>Rabi crop planning</b>	<b>Remarks on</b>
<b>Terminal drought</b>					

	<b>Situation</b>	<b>system</b>			<b>Implementation</b>
<b>Early withdrawal of monsoon</b>	Medium deep black soils	Paddy-Rainfed	Protective irrigation, harvest at physiological maturity	Chickpea short duration cultivar (Vishal, Vikas, Vijay, Digvijay, local)	--
		Finger Millet	harvest at physiological maturity, in case of poor grain filling harvest for fodder	No rabi crop	
		sorghum	As above	Chickpea (Vishal Vikas, Vijay, Digvijay,local)/ wheat, early variety (Panchawati, NIDW 15, HD 2189,Local )	
		Groundnut	harvest at physiological maturity	As above	
		Soybean	As above	Sorghum (Phule Mauli, M35-1), Chickpea (Vishal Vikas, Vijay, Digvijay,local)/ wheat (Panchawati, NIDW- 15, HD 2189,Local )	
	Deep brownish soils	Paddy -Rainfed	Protective irrigation, harvest at physiological maturity	Chickpea early variety (Vishal Vikas, Vijay, Digvijay,local)	
		Finger Millet	Harvest at physiological maturity, in case of poor grain filling harvest for fodder	--	
		sorghum	Protective irrigation, harvest at physiological maturity, in case of poor grain filling harvest for fodder	Chickpea (Vishal Vikas, Vijay, Digvijay,local) / Wheat (Panchawati, NIDW 15, HD 2189,Local )	--
		Groundnut	Harvest at physiological maturity	As above	
		Soybean	As above	As above	--

### 2.1.2 Irrigated situation

<b>Condition</b>	<b>Major Farming Situation</b>	<b>Crop/cropping system</b>	<b>Suggested Contingency measures</b>		
			<b>Change in crop/cropping system</b>	<b>Agonomic measures</b>	<b>Remarks on Implementation</b>
<b>Delayed/limited release of water in canals due to low rainfall</b>			NA		

Condition			Suggested Contingency measures		
	Major Farming Situation	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	NA				

Condition			Suggested Contingency measures		
	Major Farming Situation	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	NA				

Condition			Suggested Contingency measures		
	Major Farming Situation	Crop/cropping system	Change in crop/ cropping system	Agronomic measures	Remarks on Implementation
Lift Irrigation	Medium deep black soils	Paddy-Rainfed (Indrayani,Bhogawati, Phule Radha, R-24)	No change	Weeding,Hoeing, Irrigation at critical growth stages	
		Soybean (JS 335,DS 228)	No change	Weeding,Hoeing, Irrigation at critical growth stages	
		Sunflower (SS 56, Morden, Bhanu, Phule Raviraj,	Chickpea(Vishal, Vikas, Vijay,Digvijay , local) / <i>rabi</i> sorghum (Phule Mauli, M35-1)	Skip row irrigation	
		<i>Rabi</i> sorghum	Chickpea (Vishal, Vikas, Vijay, Digvijay , local)/ wheat ( Panchawati, Tapovan ,Trimbak, Godavari)	Sprinkler irrigation	
		Wheat	Chickpea/(Vishal, Vikas, Vijay, Digvijay , local) <i>rabi</i> sorghum /sunflower	Sprinkler irrigation,	
		Sugarcane	--	Alternate row irrigation/ drip irrigation / Trash mulching, paired row planting	

Deep brownish soil	Paddy-Rainfed (Indrayani,Bhogawati, Phule Radha, R-24)	No change	Weeding,Hoeing, Irrigation at critical growth stages
	Soybean (JS 335,DS 228)	No change	Weeding,Hoeing, Irrigation at critical growth stages
	Sunflower (SS 56, Morden, Bhanu, Phule Raviraj,	--	--
	<i>Rabi</i> sorghum	(Phule Vasudha, M35-1,Phule Yashoda)	--
	Chickpea	(Vishal, Vikas, Vijay, Digvijay , local)	Sprinkler irrigation,
	Sugarcane	--	Alternate row irrigation/ drip irrigation/ trash mulching, paired row planting.

Condition	Suggested Contingency measures				
	Major Farming Situation	Crop/cropping system	Change in crop/ cropping system	Agronomic measures	Remarks on Implementation
Insufficient groundwater recharge due to low rainfall	Medium deep black soils – Open well irrigated	Sunflower (SS 56, Morden, Bhanu, Phule Raviraj,	Chickpea(Vishal, Vikas, Vijay, Digvijay , local) / <i>rabi</i> sorghum (Phule Mauli, M35-1)	Skip row irrigation	
		<i>Rabi</i> sorghum	Chickpea (Vishal, Vikas, Vijay,Digvijay , local), wheat ( Panchawati, Tapovan ,Trimbak, Godavari)	Sprinkler irrigation	
		Wheat	Chickpea/(Vishal, Vikas, Vijay, Digvijay , local) <i>rabi</i> sorghum /sunflower	Sprinkler irrigation,	
		Sugarcane	--	Alternate row irrigation/ drip irrigation / Trash mulching, paired row planting	
	Deep brownish soil- Open well irrigated	Sunflower (SS 56, Morden, Bhanu, Phule Raviraj,	--	--	
		<i>Rabi</i> sorghum	(Phule Vasudha, M35-1,Phule Yashoda)	--	
		Chickpea	(Vishal, Vikas, Vijay, Digvijay , local)	Sprinkler irrigation,	

		Sugarcane	--	Alternate row irrigation/ drip irrigation/ trash mulching, paired row planting.	
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## 2.2 Unusual rains (untimely, unseasonal etc) (for both rainfed and irrigated situations)

Condition	Suggested contingency measure			
	Vegetative stage	Flowering stage	Crop maturity stage	Post harvest
<b>Continuous high rainfall in a short span leading to water logging</b>				
Paddy-Rainfed	Drain out excess water, Adopt necessary plant protection measures	Drain out excess water, necessary plant protection measures	Drain out excess water, harvest at physiological maturity stage	Harvest & dry in drying shade
Finger millet	As above	As above	As above	As above
<i>Kharif</i> Sorghum	As above	As above	As above	As above
Soybean	As above	As above	As above	As above
Groundnut	As above	As above	Produce must be turned frequently to reduce moisture & avoid germination of pods.	
Sugarcane	As above	As above	Tying of sugarcane, harvest the crop as early possible.	
<b>Horticulture</b>				
Chilli	As above	As above	Immediate harvesting & marketing	
Tomato	As above	As above	As above	
Brinjal	As above	As above	As above	
Sapota	As above	As above	Harvest and cleaning the fruits	
Coconut	As above	As above	As above	
Banana	As above	As above	As above	
<b>Heavy rainfall with high speed winds in a short span</b>	Not Applicable			

Condition	Suggested contingency measure			
Outbreak of pests and diseases due to un-seasonal rains	Vegetative stage	Flowering stage	Crop maturity stage	Post harvest
Paddy- Rainfed	<b>a) Disease - Leaf Blast</b> - Spraying of Carbendazim 0.1 % and subsequent 2-3 spray at interval of 15 days	<b>a)Disease: Leaf &amp; Neck blast/Nodal blast</b> - Spraying of Carbendazim 0.1 % immediately on appearance	--	--
	<b>a) Insect pest - Stem Borer:</b> Soil application of phorate 10 G @ 10 kg/ha in nursery after 15 DAS followed by spraying of quinolphos 25 EC @ 2 ml /L <b>Brown leaf hopper:</b> Spraying of Malathion 50 EC @ 2ml/L of water <b>Army Worm:</b> Spraying of Endosulphan @ 1.5 ml /L lit of water	<b>a) Insect pest – Stem Borer:</b> Soil application of phorate 10 G @ 10 kg/ha in nursery after 15 DAS followed by spraying of quinolphos 25 EC @ 2ml L <b>Brown leaf hopper-:</b> Spraying of Malathion 50 EC 2ml /L of water <b>Army Worm:</b> Spraying of Endosulphan @ 1.5ml /L of water	--	--

Finger millet	<b>a) Disease- Leaf Blast-</b> Spraying of Carbendazim 0.1 % and subsequent 2-3 spray at interval of 15 days	<b>a) Disease- Leaf Blast-</b> Spraying of Carbendazim 0.1 % and subsequent 2-3 sprays at interval of 15 days	--	--
	<b>b) Insect pest- Army Worm:</b> Spraying of Endosulphan @ 1.5ml /L of water	<b>b) Insect pest- Army Worm:</b> Spraying of Endosulphan @ 1.5ml /L of water	--	--
Maize	<b>a) Disease- Turcium leaf blight-</b> 2-3 sprayings of Mancozeb 0.25% at an interval of 15 days	<b>a) Disease- Turcium leaf blight-</b> Spraying of Mancozeb 0.25 % during dry silk stage	--	--
	<b>b) Insect pest Stem Borer:</b> Spraying of Chloropyriphos 2 ml/ L of water. <b>Army Worm:</b> Spraying of Endosulphan @ 1.5 ml /L lit of water	<b>b) Insect pest Stem Borer:</b> Spraying of Chloropyriphos @ 2 ml /L of water. <b>Army Worm:</b> Spraying of Endosulphan @ 1.5ml /L of water	--	--
Sorghum	<b>a) Disease-</b>	<b>a) Disease Downy mildew-</b> 4 sprayings of Copper	--	--

	<b>Downy mildew-</b> 4 sprayings of Copper oxichloride 50 WP 0.25 % or Metalaxyl MZ-72 0.2 % at interval of 10 days	oxichloride 50 WP 0.25 % or Metalaxyl MZ-72 0.2 % at interval of 10 days		
	<b>b) Insect pest:</b> <b>i) Shootfly:</b> - Installation of fish meal traps - Spraying of endosulphan @ 1.5 ml /L of water <b>ii) Stem Borer:</b> Spraying of chloropyriphos @ 2ml/L of water	<b>b) Insect pest</b> <b>Stem Borer:</b> Spraying of chloropyriphos @ 2.0 ml /L of water	--	--
Soybean	<b>a) Disease</b> <b>Rust-</b> Spraying the crop with Propiconazole 0.1%	<b>a) Disease</b> <b>Rust-</b> Spraying the crop with Propiconazole 0.1%	--	--
	<b>b) Insect pest</b> <b>Leaf eating caterpillar/Hairy caterpillar:</b> - Installation of pheromone traps - Dusting of Methyl parathion 2% or Quinolphos 1.5 % or Endosulphon 4% dust @ 20kg /ha. or spraying of Chloropyriphos 20EC 2 ml/L or Endosulphan 35 EC 2.0 ml /L of water	<b>b) Insect pest</b> <b>Leaf eating caterpillar/Hairy caterpillar:</b> - Installation of pheromone traps - Dusting of Methyl parathion 2% or Quinolphos 1.5 % or Endosulphon 4% dust @ 20kg /ha. or Spraying of Chloropyriphos 20 EC or Endosulphan 35 EC 2.0 ml /L of water	--	--
Groundnut	<b>a) Disease</b> <b>Tikka &amp; Rust-</b> Spraying of Mancozeb 0.25%	<b>a) Disease</b> <b>Tikka &amp; Rust-</b> Spraying of Mancozeb 0.25%	--	--
	<b>b) Insect pest</b> <b>Thrips &amp; Hopper:</b> Spraying of Dimethoate or Methyl dematon @ 1.5 ml/L of water.	<b>b) Insect pest</b> <b>Leaf Roller:</b> Spraying of Quinolphos 25 EC @ 2.0ml /L of water	--	--
Sugarcane	<b>b) Insect pest</b> <b>Stem Borer:</b> Soil application of Endosulphan 4% dust 50 kg/ha or 20% Chloropyriphos 5 Lit in 1000 lit of water through water channel. <b>Topshoot borer:</b> Endosulfan 2.0 ml/L of water	<b>b) Insect pest:</b> <b>Top Shoot borer:</b> Soil application of Endosulphan 4% dust 50 kg/ha or 20% Chloropyriphos 5 lit in 1000 lit of water through water channel. <b>Leaf Hopper/Pyrrilla:</b> Diamethoate 30 EC / Malathion 50EC /Quinolphos 25 EC @ 1.5 to 2.0 ml/L of water <b>White Woolly aphid:</b> Soil application Phorate 10G 15 kg/ha, or spraying of Methyl dematon 25%EC or Diamethoate 30 EC @ 1.5 to 2.0 ml/L of water.	--	--
<b>Horticulture crops</b>				
Mango	<b>a) Insect pest –</b>	<b>a) Disease</b>	--	--

	<b>Mango hopper –</b> Spraying of 50 % carbaryl 2 g/lit or dust 10% carbaryl 20kg/ha	<b>Powdery mildew:</b> - Dusting of sulphur 300 mesh @ 20 kg/ha. - Spraying of Carbendenzim 0.1% or 0.1% hexaconazole  <b>Anthraco nose:</b> Copper oxychloride 0.25% or carbondenzim 0.1% at interval of 10 days		
Grape	<b>a) Insect pest –</b> <b>Mealy bug –</b> - Use stick traps on trunks and girdles, - Spraying of malathion 50 EC2 ml/lit <b>b) Disease</b> <b>Powdery Mildew:</b> Spraying of Penconazole 0.05 % 4 times First spray 15 day after October pruning & subsequent sprays at interval of 15 days	<b>a) Insect pest –</b> <b>Mealy bug –</b> - Use stick traps on trunks and girdles, - Spraying of malathion 50 EC2 ml/lit <b>b) Disease</b> <b>Powdery Mildew:</b> Spraying of Penconazole 0.05 % 4 times First spray 15 day after October pruning & subsequent sprays at interval of 15 days	<b>a) Insect pest</b> <b>Mealy bug-</b> Use stick traps on either side of berry bunches --	--
Ber	<b>a) Disease</b> <b>Powdery Mildew-</b> Spray 0.2% wettable sulphur	<b>a) Disease</b> <b>Powdery Mildew-</b> 0.2% wettable sulphur 4 sprays at 20 days interval <b>b) Insect pest</b> <b>Fruit fly –</b> Dusting with 10 % carbaryl @ 20 kg/ha or spraying of 50 % carbaryl @ 2 g/lit water	--	--
Cabbage, Cauliflower, Cucumber	<b>Downy mildew :</b> Copper oxychloride 0.25% or Metalaxyl 0.8%		--	--
	<b>b) Insect pest</b> <b>Thrips/Aphids/Jassids:</b> Soil application of Phorate 10G 10 kg/ha or spraying of Endosulphon 35 EC or Malathion 50EC ml or Diamethoate 30EC @ 0.5 ml /L of water. <b>Black fly:</b> Endosulphon 35 EC or Malathion 50EC or Diamethoate 30EC @ 1.5 to 2.0 ml/L		--	--
Potato, Onion, Tomato, Cabbage	<b>Alternaria leaf blight:</b> Mancozeb @ 0.25% or carbondenzim @ 0.25% or chlorothalonil @ 0.1%		--	--
	<b>b) Insect pest</b> <b>Hoppers/White fly /Leaf roller/Fruit borer:</b> Endosulphon 35 EC or Malathion 50EC or Diamethoate 30EC @ 1.5 ml/L of water		--	--

### 2.3 Floods

Condition	Suggested contingency measure			
	Seedling/	Vegetative stage	Reproductive stage	At harvest
Transient water logging/partial				

<b>inundation</b>	<b>nursery stage</b>			
Paddy	Drain out excess water / Reseeding	Transplanting, Drain out excess water, Plant protection	Drain out excess water, Plant protection	Drain out excess water
Finger millet	Re sowing	Drain out excess water, Plant protection	As above	As above
<i>Kharif</i> sorghum	As above	As above	As above	--
Soybean	As above	As above	As above	--
Groundnut	As above	As above	As above	--
Sugarcane	Gap filling by using sugarcane seedlings	Drain out excess water, necessary plant protection measures	Propping of sugarcane, Harvest the crop as early possible.	
<b>Horticulture</b>				
Mango	Drain out excess water	Drain out excess water	Drain out excess water	Plant protection
Cashew	Drain out excess water, effective measures to check soil erosion	Drain out excess water, effective measures to check soil erosion	Plant protection	--
Coconut	Drain out excess water	Nutrient management	Drain out excess water	--
Banana	As above	Propping	Propping, Drain out excess water	Processing & marketing
Tomato/ Brinjal/ Chilli	Drain out excess water, plant protection	Use of GR to check flower drop	Staking to plants	--
Cole crops	As above	Drain out excess water	Immediate harvesting & marketing	--
Tuber & bulb crops	As above	Drain out excess water, turning of vines	As above	Proper storage
Leafy vegetable	As above	As above	Harvesting	--
<b>Continuous submergence for more than 2 days</b>				--
Paddy- Rainfed	Retransplanting	Drain out excess water & application additional N dose	Drain out excess water & application additional N dose	--
Sugarcane	Gap filling by using sugarcane seedlings	Drain out excess water & application N dose	Drain out excess water & application special N dose	--
<b>Sea water inundation</b>	Not Applicable			

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

**2.5 Contingent strategies for Livestock and Poultry in KOLHAPUR District**

**2.5.1 Livestock**

	<b>Suggested contingency measures</b>		
	<b>Before the event</b>	<b>During the event</b>	<b>After the event</b>
<b>Drought</b>	NA		

<p><b>Floods</b></p>	<p>In case of early forewarning (EFW), harvest all the crops (Sorghum/Bajra./maizewheat/chick pea/soybean etc.) that can be useful as feed/fodder in future (store properly)</p> <p>Protect the dried Dongri grass, sorghum stover etc., from inundation of flood water</p> <p>Keeping sufficient of dry fodder to transport to the flood affected villages</p> <p>Don't allow the animals for grazing if severe floods are forewarned</p> <p>Keep stock of bleaching powder and lime</p> <p>Carry out Butax spray for control of external parasites</p> <p>Procure and stock emergency medicines and vaccines for important endemic diseases of the area</p> <p>All the stock must be immunized for endemic diseases of the area</p> <p>Surveillance and disease monitoring network to be established at Joint Director (Animal Husbandry) office in the district</p> <p>Adequate refreshment training on draught management to be given to VAS, Jr.VAS, LI with regard to health &amp; management measures</p> <p>Identify the Clinical staff and trained paravets and indent for their services as per schedules</p> <p>Identify the volunteers who can serve in need of emergency</p> <p><b>Arrangement for transportation of animals from low lying area to safer places and also for rescue animal health workers to get involve in rescue</b></p>	<p>Transportation of animals to elevated areas</p> <p>Proper hygiene and sanitation of the animal shed</p> <p>In severe storms, un-tether or let loose the animals</p> <p>Use of unconventional and locally available cheap feed ingredients for feeding of livestock.</p> <p>Avoid soaked and mould infected feeds / fodders to livestock</p> <p>Carryout deworming to all animals entering into relief camps</p> <p>Identification and quarantine of sick animals</p> <p>Constitution of Rapid Action Veterinary Force</p> <p>Performing ring vaccination (8 km radius) in case of any outbreak</p> <p>Restricting movement of livestock in case of any epidemic</p> <p>Emergency outlet establishment for required medicines or feed in each village</p> <p>Spraying of fly repellants in animal sheds</p>	<p>Repair of animal shed</p> <p>Bring back the animals to the shed</p> <p>Cleaning and disinfection of the shed</p> <p>Bleach (0.1%) drinking water / water sources</p> <p>Encouraging farmers to cultivate short-term fodder crops like sunhemp.</p> <p>Deworming with broad spectrum dewormers</p> <p>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</p> <p>Drying the harvested crop material and proper storage for use as fodder.</p> <p>Keep close surveillance on disease outbreak.</p>
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	<b>operations</b>		
<b>Cyclone</b>	<b>NA</b>		
<b>Cold wave</b>	<b>Cold wave :</b> Covering all the wire meshed walls / open area with gunny bags/ polyethylene sheets (with a mechanism for lifting during the day time and putting down during night time)	Allow for late grazing between 10AM to 3PM during cold waves Add 25-50 ml of edible oil in concentrates and fed to the animal during cold waves In severe cases, put on the heaters at night times Apply / sprinkle lime powder in the animal shed during cold waves to neutralize ammonia accumulation	Feed the animals as per routine schedule Allow the animals for grazing (normal timings)
<b>Insurance</b>	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)**

<b>Disease</b>	<b>Season</b>
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:**

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

**2.5.2 Poultry**

	<b>Suggested contingency measures</b>		
	<b>Before the event</b>	<b>During the event</b>	<b>After the event</b>
<b>Drought: NA</b>			
<b>Floods</b>			
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 lime powder in pit Disposal of poultry manure to prevent protozoal problem Supplementation of coccidiostats in feed Vaccination against RD
<b>Cyclone</b>	<b>NA</b>		
<b>Heat wave</b>	<b>NA</b>		
<b>Cold wave</b>			
Shelter/environment management	Provision of proper shelter Arrangement for brooding Assure supply of continuous electricity	Close all openings with polythene sheets In severe cases, arrange heaters Don't allow for scavenging during early morning and late evening	Routine practices are followed

<sup>a</sup> based on forewarning wherever available

**2.5.3 Fisheries/ Aquaculture**

	Suggested contingency measures		
	Before the event	During the event	After the event
<b>1) Drought</b>			
<b>A. Capture</b>			
Marine			
Inland			
(i) Shallow water depth due to insufficient rains/inflow	<ol style="list-style-type: none"> <li>1. Proper planning of water storage</li> <li>2. Conservation &amp; development of water resources by construction of reservoirs &amp; dams.</li> <li>3. Avoid seepage losses by lining the canals.</li> <li>4. Adopt rain water harvest techniques.</li> <li>5. Farmer's organizations, water users &amp; private sectors should be involved in construction, operation &amp; maintenance of irrigation system.</li> <li>6. To make people aware about conservation of water.</li> <li>7. Critical analysis of long range a Forecast data.</li> <li>8. Storage of water.</li> <li>9. A forestation program.</li> <li>10. Conservation of rivers/reservoir/ponds.</li> <li>11. Re-excavation of local canals and reservoirs.</li> </ol>	<ol style="list-style-type: none"> <li>1. Maintenance of dams &amp; reservoirs to avoid leakage &amp; to control theft of water.</li> <li>2. Proper use of water resources on priority base.</li> <li>3. Add water in shallow water pond.</li> <li>4. Use stored water.</li> <li>5. Use surface water flow.</li> <li>6. Divert water from unutilized areas.</li> <li>7. Utilize canal water.</li> <li>8. Aeration of water in ponds/reservoirs.</li> </ol>	<ol style="list-style-type: none"> <li>1. Regular desiltation of reservoirs &amp; dams.</li> <li>2. Govt. should make laws on water conservation.</li> <li>3. To develop demand oriented system.</li> <li>4. Govt. should make laws to stop deforestation.</li> <li>5. Need based monitoring through research plan.</li> <li>6. Intensive forestation program.</li> <li>7. Augmentation of surface water flow.</li> <li>8. Strengthening of water reservoirs.</li> <li>9. Rain water harvesting .</li> <li>10. Compensation claims.</li> <li>11. Prepare vulnerability map and place it to management committee</li> </ol>
(ii) Changes in water quality	<ol style="list-style-type: none"> <li>1. Storage of water disinfectant such as chlorine, alum etc. at</li> </ol>	<ol style="list-style-type: none"> <li>1. Provision of water filtration system for the ponds to overcome the water</li> </ol>	<ol style="list-style-type: none"> <li>1. Removal of runoff from land by proper means before decomposition.</li> </ol>

	<p>district level.</p> <ol style="list-style-type: none"> <li>Prohibit dumping of solid, liquid and waste in water sources.</li> <li>Preparedness with stocks of chemicals, disinfectants and therapeutic drugs.</li> </ol>	<p>contamination-</p> <ol style="list-style-type: none"> <li>Use disinfectants and therapeutic drugs.</li> <li>Adoption of bio-remedial measures</li> </ol>	<ol style="list-style-type: none"> <li>Supply of water filtration system even after the event &amp; creating awareness in farmers.</li> <li>Need based research data should be generated on water quality.</li> <li>Dumping of solid, liquid and waste in water bodies should be stopped through enactment of legislation.</li> </ol>
<b>B. Aquaculture</b>			
(i) Shallow water in ponds due to insufficient rains/inflow	<ol style="list-style-type: none"> <li>Available resources will be identified and need to be kept ready for each district on the basis of forecasting of insufficient rain.</li> <li>To avoid loss due to seepage, infiltration &amp; leakage by using bentonite, ash, polythene liners etc.</li> <li>Maintain the level of water by pumping water into pond.</li> <li>Critical analysis of long range Forecast data.</li> <li>Storage of water.</li> <li>A forestation program.</li> <li>Conservation of rivers/reservoir/ponds.</li> <li>Re-excavation of local canals and reservoirs.</li> </ol>	<ol style="list-style-type: none"> <li>Water resources of the areas will be exploited with planning of proper transport facilities in affected areas.</li> <li>Maintain the level of water to the required depth.</li> <li>Add stored water in shallow water depth.</li> <li>Harvesting of fishes as early as possible to avoid mortality.</li> <li>Use stored water.</li> <li>Use surface water flow.</li> <li>Divert water from unutilized areas.</li> <li>Utilize canal water.</li> </ol> <p>Aeration of ponds</p>	<ol style="list-style-type: none"> <li>Available resources need to be listed with adequate transport arrangement.</li> <li>Desiltation of pond bottom.</li> <li>Maintenance of tanks &amp; ponds</li> <li>Need based monitoring through research plan.</li> <li>Intensive a forestation program.</li> <li>Augmentation of surface water flow.</li> <li>Construction of water reservoirs.</li> <li>Adoption of rain harvesting methods.</li> <li>Compensation claims .</li> <li>Prepare vulnerability map and place it to management committee</li> </ol>
(ii) Impact of salt load build up in ponds / change in water quality	<ol style="list-style-type: none"> <li>Minimize evaporation losses.</li> <li>Dilution of water if salt load is high.</li> <li>Available resources will be identified &amp; need to be kept ready for each district on the basis of forecasting of</li> </ol>	<ol style="list-style-type: none"> <li>Dilution of water or exchange water to avoid salt builds up.</li> <li>Harvesting the marketable fish to reduce the density.</li> <li>Use disinfectants and therapeutic drugs.</li> </ol> <p>Adoption of bio-remedial measures</p>	<ol style="list-style-type: none"> <li>Trapping the water resources from other places for dilution to reduce salt load.</li> <li>Need based research data should be generated on water quality.</li> <li>Dumping of solid, liquid and waste should be stopped through enactment of legislation.</li> </ol>

	<p>insufficient rain to reduce the salinity by trapping available water resources.</p> <p>4. On the basis of forecasting advising fish farmers for harvesting of marketable fish.</p> <p>5. Prohibit dumping of solid, liquid and waste in water sources.</p> <p>6. Preparedness with stocks of chemicals, disinfectants and therapeutic drugs</p>		
<b>2) Floods</b>			
<b>A. Capture</b>			
Marine			
Inland			
(i) Average compensation paid due to loss of human life	<p>1. Fishermen will be given forewarning regarding heavy rains and advised not to go for fishing in rivers/reservoirs.</p> <p>2. Areas need to be identified in each district prone for flood.</p> <p>3. Maintenance of water drainages in proper way to avoid blockage.</p> <p>4. Proper forecasting information should be available.</p> <p>5. Be prepared to evacuate at a short notice.</p> <p>6. Preparation of flood control action plan.</p> <p>7. Warning dissemination and precautionary response.</p> <p>8. Formation of flood management committee.</p> <p>9. Enhancement in coping</p>	<p>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.</p> <p>2. Sufficient stock of food, medicine etc. should be available.</p> <p>3. Govt. should take necessary action &amp; provide trained people for rescue operation during flood.</p> <p>4. Human evacuation from the area.</p> <p>5. Coordination of assistance.</p> <p>6. Damage and need assessment.</p> <p>7. Immediate management of relief supplies.</p> <p>8. Immediate help delivery.</p>	<p>1. The victim's family shall be provided with compensation up to Rs. 1, 00,000/- for the deaths occurring during the fishing.</p> <p>2. Rehabilitation of people.</p> <p>3. Identify the causes of flood affected area &amp; take necessary preventive measures.</p> <p>4. Arrangement for rescue and casualty care.</p> <p>5. Arrangement for burial control room.</p> <p>6. Restoration of essential services, security and protection of property.</p> <p>7. Support to rehabilitation, logistics, training and awareness build up &amp; testing and updating the plan.</p> <p>8. Insurance and compensation claim.</p>

	capabilities of common people. 10. Insurance for the life of people/fishermen.		
(ii) No. of boats / nets/damaged	<ol style="list-style-type: none"> <li>1. The prior information on safe keeping of boats and nets will be provided to the fishermen.</li> <li>2. If prior information is given bring boats &amp; nets towards the safer side.</li> <li>3. Annual repair of boats/nets and gears.</li> <li>4. Insurance of boats/nets/gears.</li> </ol>	<ol style="list-style-type: none"> <li>1. Fishermen will be advised to stop fishing during the floods and heavy rainfall.</li> <li>2. Continuous monitoring on water level is required.</li> <li>3. Coordination of assistance</li> <li>4. Immediate management of relief supplies.</li> <li>5. Govt. support and compensation.</li> </ol>	<ol style="list-style-type: none"> <li>1. The affected fishermen will provided with compensation up to Rs. 50,000/- for damaged boats or nets.</li> <li>2. Education and training for the repair of boats/nets and gears.</li> <li>3. Loss assessment &amp; insurance claim.</li> </ol>
(iii) No.of houses damaged	<ol style="list-style-type: none"> <li>1. Forewarning regarding heavy rainfall, sudden downpour and floods will be spread in the fishermen villages on the banks of rivers.</li> <li>2. Shift the people to safer places.</li> <li>3. Proper maintenance of <i>Kaccha</i> houses.</li> <li>4. Education and training for the repair of houses</li> <li>5. Store raw material for emergency repair of houses.</li> </ol> <p>House insurance</p>	<ol style="list-style-type: none"> <li>1. Temporary shelter to the affected families will be provided.</li> <li>2. Arrangement of temporary shelters for homeless people.</li> <li>3. Damaged house enumeration and need assessment.</li> <li>4. Coordination of assistance.</li> <li>5. Immediate management of relief supplies.</li> </ol>	<ol style="list-style-type: none"> <li>1. The housing facilities on higher elevation shall be provided to affected families by the Government agencies.</li> <li>2. Provide compensation from Govt. to build/repair houses.</li> <li>3. Loss assessment &amp; insurance claim.</li> <li>4. Govt. assistance claim.</li> </ol>
(iv) Loss of stock	<ol style="list-style-type: none"> <li>1. Harvesting the existing fish stock</li> <li>2. Keep boats, nets/gears ready for emergency use.</li> <li>3. Store fuels, food/other item</li> <li>4. Develop flood control management plans.</li> </ol>	<ol style="list-style-type: none"> <li>1. Search/locate the tock/input.</li> <li>2. Mobilize local people for protection.</li> <li>3. Hire stock/inputs from distant areas/company/ farmers who are not affected by flood</li> </ol>	<ol style="list-style-type: none"> <li>1. Provided subsidy on seeds by Govt.</li> <li>2. Implementation of Insurance policy.</li> <li>3. Locate backup stocks and verify its usability time.</li> <li>4. Follow flood control management plan.</li> <li>5. Notify utilities of the critical demand about loss of stock and inputs.</li> <li>6. Loss assessment &amp; insurance claim.</li> </ol>

	5. .Stock material insurance.		
(v) Changes in water quality	<ol style="list-style-type: none"> <li>1.Storage of water disinfectant such as chlorine, alum etc. at district level.</li> <li>2. Provision to stop/close the effluent/sewage discharge point in water odies</li> <li>3. Store chemicals, disinfectants and therapeutic drugs.</li> <li>4. Develop flood control management plan.</li> </ol>	<ol style="list-style-type: none"> <li>1.Provision of water filtration system for the ponds to overcome the water contamination-</li> <li>2. Do not use contaminated water</li> <li>3. Proper preparation and management through emergency aeration.</li> <li>4. Use appropriate amount of disinfectants, chemicals and therapeutic drugs.</li> <li>5. Immediate support of Govt./industrial organizations for maintaining the purity and quality of water bodies.</li> <li>6. Need based bioremediation</li> </ol>	<ol style="list-style-type: none"> <li>1.Removal of runoff from land by proper means before decomposition.</li> <li>2.Supply of water filtration system even after the event &amp; creating awareness in farmers.</li> <li>3. Need based research data should be generated to maintain water quality,</li> <li>4. Dumping of solid, liquid and waste should be stopped through enactment of legislation.</li> <li>5. Contact Govt. and industrial organization for immediate remedy and cleaning of the water bodies.</li> <li>6. Regular water monitoring and bio-monitoring of water bodies for formulation of management plan</li> </ol>
(vi) Health and diseases	<ol style="list-style-type: none"> <li>1. Water filtration system &amp; control measures for diseases should be available.</li> <li>2. Advance planning and preparedness.</li> <li>3. Store chemicals, disinfectants and therapeutic drugs.</li> <li>4. Stock sufficient stores of medicines</li> </ol>	<ol style="list-style-type: none"> <li>1. Periodical checking particularly with respective fish mortality should be done during flood &amp; dead fishes disposed properly.</li> <li>2. Prompt action or immediate removal of disease causing agents/ dead fish, followed by sterile or landfill disposal.</li> <li>3. Use appropriate amount of disinfectants, chemicals and therapeutic drugs.</li> <li>4. Emergency aeration or splashing in water bodies.</li> </ol>	<ol style="list-style-type: none"> <li>1.Setting health &amp; disease management training centre at district level for fisherman community by Govt. or with the help of NGO.</li> <li>2. Laboratory diagnosis of diseased fish, generation of data about type or kind of disease spread.</li> <li>3. Eradicating the disease where possible.</li> <li>4. Follow up surveillance and monitoring after disease outbreak.</li> <li>5. Need based research data should be generated.</li> <li>6. Loss assessment &amp; insurance claim.</li> </ol>
<b>B. Aquaculture</b>			
(i) Inundation with flood water	1.In the flood prone areas proper draining system from ponds need to be developed and planned in	1. On the basis of forecasting information to farmers for sale of marketable fish with sufficient transport facility through various	1). Planning even after the event should be made for proper drainage and creating awareness and trainings in

	<p>flood situation before forecasting of flood.</p> <ol style="list-style-type: none"> <li>2. Site should be away from flood prone area.</li> <li>3. Dyke should be stable in all weather condition &amp; not liable to collapse during heavy rains.</li> <li>4. Proper channels to be provided to pass surplus water &amp; to avoid breakage to the bundh.</li> <li>5. Proper facility construction for ponds and its stock safety.</li> <li>6. Development of flood control management plan.</li> <li>7. Preparedness with emergency backup equipment on site.</li> <li>8. Stock insurance.</li> <li>9. Preventive measures against entry of alien/wild organisms through flood water.</li> </ol>	<p>media. Proper drainage should be adopted so that inundation with flood water should be minimized.</p> <ol style="list-style-type: none"> <li>2. On the basis of forecasting, information to farmers for sale of marketable fish with sufficient transport facility through various media.</li> <li>3. 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.</li> <li>4. Arrangement for evacuation.</li> <li>5. Arrangement for rescue and casualty care.</li> <li>6. Arrangement for burial control room.</li> <li>7. Restoration of essential services, security and protection of property.</li> <li>8. Coordination of assistance.</li> <li>9. Damage and need assessment.</li> <li>10. Immediate management of relief supplies.</li> <li>11. Release excess water from height of T.</li> <li>12. Lower the water level in culture facilities.</li> </ol>	<p>flood situations.</p> <ol style="list-style-type: none"> <li>2). Pinning even after the event should be made for proper drainage &amp; creating awareness &amp; training in flood situation.</li> <li>3) Support to rehabilitation, logistics, training and awareness build up &amp; testing and updating the plan</li> <li>4) Reallocate fish to maintain appropriate biomass so that waste assimilation capacity of pond is not exceeded.</li> <li>5) Reduce or cease feeding because uneaten food and fish waste decreases the dissolved oxygen level.</li> <li>6) Strengthening of water bodies/ponds.</li> <li>7) Loss assessment &amp; insurance claim.</li> </ol>
(ii) Water contamination and changes in water quality	<ol style="list-style-type: none"> <li>1. Availability of water purifier i.e., chlorine, alum etc at district level.</li> <li>2. Availability of water disinfectant such as chlorine, alum etc at district level.</li> <li>3. Use of calcium hydroxide @ 150 kg/ha</li> <li>4. Store chemicals, disinfectants and therapeutic drugs</li> <li>5. Develop flood control management plan</li> </ol>	<ol style="list-style-type: none"> <li>1). Supply of water purifier for the ponds to overcome the contamination and changes in BOD.</li> <li>2). Supply of water filtration system for ponds to overcome the contamination.</li> <li>Use of <math>\text{kmno}_4</math> for bath of fish as prophylactics</li> <li>3). Do not use contaminated water.</li> <li>4) Proper preparation and management through emergency aeration (paddle wheel aerator/circulating aerator), that may improve water quality in affected areas.</li> <li>5) Use appropriate amount of disinfectants, chemicals and therapeutic drugs.</li> <li>6) Maintaining the purity and quality of water bodies.</li> <li>7) Need based bioremediation.</li> </ol>	<ol style="list-style-type: none"> <li>1). Supply of water purifier even after the event and creating awareness in farmers.</li> <li>2). Supply of water filtration system even after the event &amp; crating awareness in farmers.</li> <li>3). Lime treatment for oxidation</li> <li>4). To maintain water quality, need based research data should be generated</li> <li>5). Dumping of solid, liquid and waste should be stopped through enactment of legislation.</li> <li>6). Immediate remedy and cleaning of water bodies.</li> <li>7). Regular water monitoring and bio-monitoring of water bodies for</li> </ol>

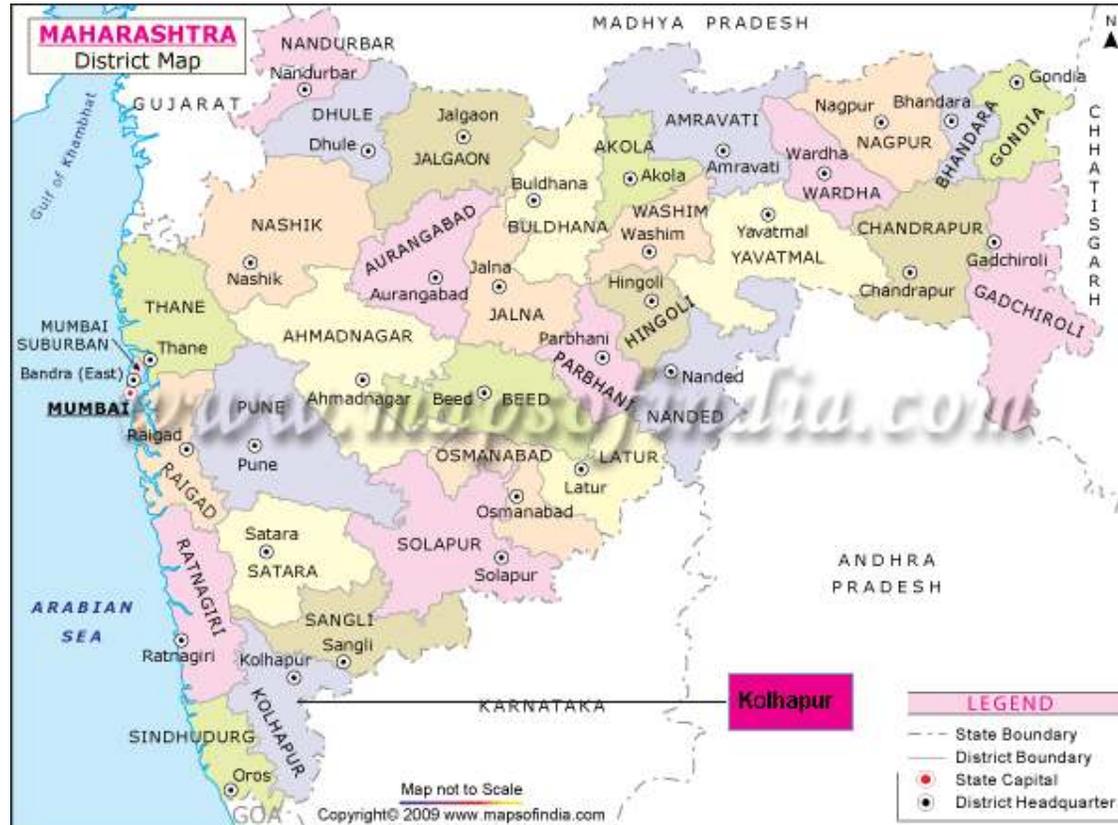
			formulation of management plan.
(iii) Health and diseases	<ol style="list-style-type: none"> <li>1. Storage of water purifiers and control measures for diseases should be available.</li> <li>2. Personnel should be trained for health &amp; disease management through training</li> <li>3. &amp; list of trained personnel should be available at each district level.</li> <li>4. Adequate stock of medicine should be available at each district level.</li> <li>5. Antibiotics fortified feeding as prophylactics</li> <li>6. Advance planning and preparedness.</li> <li>7. Store chemicals, disinfectants and therapeutic drugs.</li> <li>8. Stock sufficient emergency medicines.</li> </ol>	<ol style="list-style-type: none"> <li>1. Periodical checking particularly with respective fish mortality should be done during flood.</li> <li>2. Services of trained personnel need to be made available in affected areas with sufficient supply of life saving medicines.</li> <li>3. Disinfectants formalin treatments as prophylactics</li> <li>4. Identification of type of disease outbreak, immediate removal of disease causing agents/ dead fish.</li> <li>5. Use appropriate amount of disinfectants, chemicals and therapeutic drugs.</li> <li>6. Determination of nature and speed of transmission of diseases.</li> <li>7. Emergency aeration or splashing in water bodies</li> </ol>	<ol style="list-style-type: none"> <li>1). Setting health and disease management training centre at district level for fishermen and government officials.</li> <li>2). Routine training programmed as a refresher course need to be implemented in relation to health &amp; disease management during flood.</li> <li>3). Lime treatment for oxidation</li> <li>4). Laboratory diagnosis of diseased fish, generation of data about type or kind of disease spread.</li> <li>5). Eradicating the disease.</li> <li>6). Follow up surveillance and monitoring.</li> <li>7). Proper disposal of dead fish.</li> <li>8). Loss assessment &amp; insurance claim</li> </ol>
(iv) Loss of stock and inputs (feed, chemicals etc)	<ol style="list-style-type: none"> <li>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.</li> <li>2). Flood situation going to exist then move the feed, chemicals &amp; other accessories to safer places.</li> <li>3). Keep the stock/input at safe place for emergency purpose.</li> <li>4). Store fuels, food/other item.</li> <li>5). Develop flood control management plan.</li> <li>6). Stock material insurance.</li> </ol>	<ol style="list-style-type: none"> <li>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.</li> <li>2). Available fish stock should be recovered. Stock of inputs must be stored in well protected area.</li> <li>3). Search/locate the stock/input.</li> <li>4). Purchase/hire valuable stock/inputs from distant areas not affected by flood.</li> </ol>	<ol style="list-style-type: none"> <li>1) The fish farmers shall be provided with fish seed and feed at concessional rates.</li> <li>2) Feeds, chemicals etc required for the culture operation should be purchased.</li> <li>3) Strengthening of stocks.</li> <li>4) Assessment of total loss.</li> <li>5) Insurance claims</li> </ol>
(v) Infrastructure damage (pumps, aerators, huts etc)	<ol style="list-style-type: none"> <li>1) Prior information regarding removal of Pumps and aerators shall be given to the fish farmers.</li> </ol>	<ol style="list-style-type: none"> <li>1) Pumps, aerator and generators shall be removed from the pond before the event.</li> <li>2) Use manual techniques for aeration or make</li> </ol>	<ol style="list-style-type: none"> <li>1. Suitable Compensation for the damaged machinery shall be given to the fish farmers.</li> </ol>

	<ul style="list-style-type: none"> <li>2) Flood situation going to exist then move the pumps, aerators &amp; other accessories to safer places.</li> <li>3) Educate and provide training for the repair of infrastructure.</li> <li>4) Follow flood control management plan.</li> <li>5) Store raw materials for repairing of pumps aerators, huts etc.</li> <li>6) Infrastructure insurance.</li> </ul>	<ul style="list-style-type: none"> <li>substitute arrangement for the same.</li> <li>3) Notify utilities of the critical demand.</li> <li>4) Coordination of assistance.</li> <li>5) Immediate management of relief supplies.</li> </ul>	<ul style="list-style-type: none"> <li>2. Install the equipments during flood.</li> <li>3. Damaged infrastructure enumeration and need assessment.</li> <li>4. Locate backup equipment and verify its operation.</li> <li>5. Repair of damaged infrastructure.</li> <li>6. Loss assessment &amp; insurance claim.</li> </ul>
(vi) Any other			
<b>3. Cyclone / Tsunami</b>			
A. Capture			
Marine			
(i) Average compensation paid due to loss of fishermen lives			
(ii) Avg. no. of boats / nets/damaged			
(iii) Avg. no. of houses damaged			
Inland			
B. Aquaculture			
(i) Overflow / flooding of ponds	<ul style="list-style-type: none"> <li>1. If intensity of cyclone with heavy rain fall exists then harvest existing fish stock.</li> <li>2. Dike should be stable in all weather condition &amp; not liable to collapse during flood.</li> </ul>	<ul style="list-style-type: none"> <li>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</li> <li>2. Enhancement of dykes height by sand bags</li> </ul>	<ul style="list-style-type: none"> <li>1. Planning even after the event should be made for proper drainage &amp; creating awareness &amp; training in storm situation.</li> </ul>
(ii) Changes in water quality (fresh water / brackish water ratio)	<ul style="list-style-type: none"> <li>1. Supply of water for correcting the changes in fresh water &amp; brackish water.</li> <li>2. Maintain salinity by addition of fresh water up to 20-25 ppt.</li> </ul>	<ul style="list-style-type: none"> <li>1. Supply of water for correcting the changes in fresh water &amp; brackish water.</li> <li>2. Use euryhaline species</li> </ul>	<ul style="list-style-type: none"> <li>1. Water storage facility needs to be developed to overcome the problem of changes in fresh &amp; brackish water ratio.</li> <li>2. use Euryhaline species for culture</li> </ul>

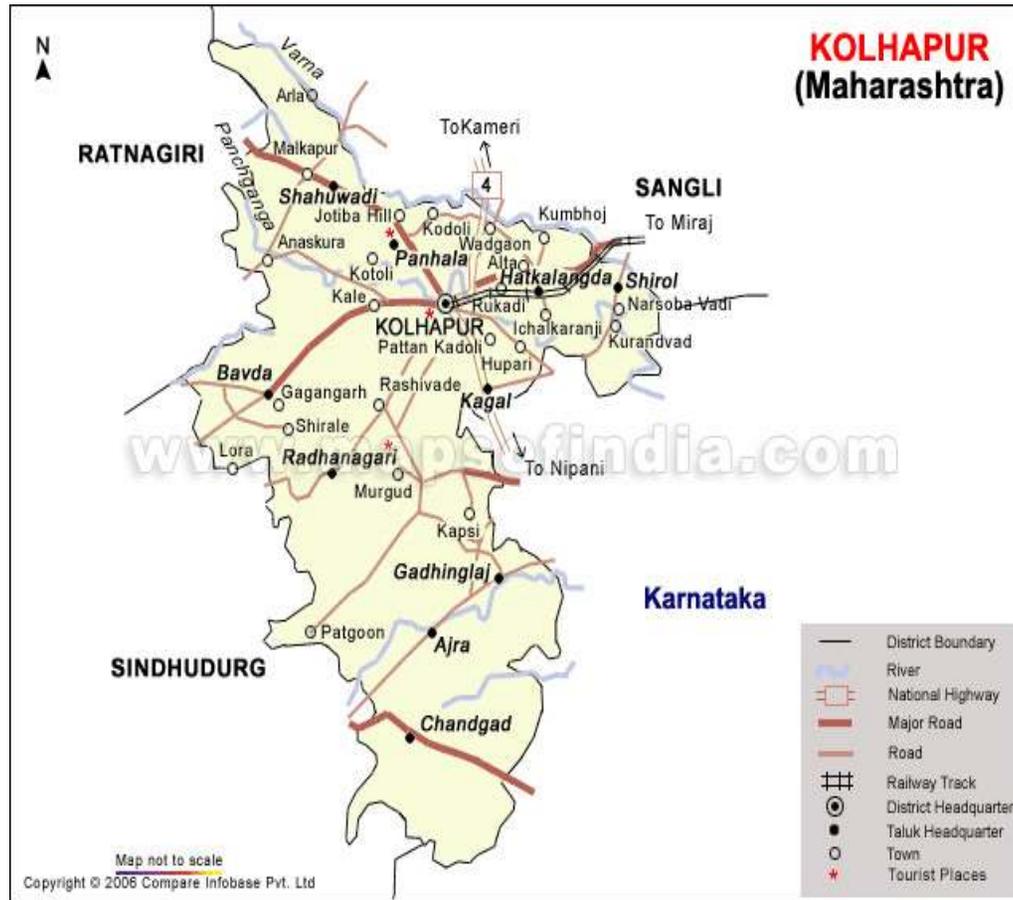
(iii) Health and diseases	<ol style="list-style-type: none"> <li>1. Water filtration system &amp; control measures for disease should be available.</li> <li>2. Adequate stock of medicine should be available at each district level.</li> <li>3. Liming and formalin treatment</li> </ol>	<ol style="list-style-type: none"> <li>1. Periodically checking particularly in respective of fish mortality &amp; water parameter during flood.</li> <li>2. Disinfectants treatments</li> </ol>	<ol style="list-style-type: none"> <li>1. Settling health &amp; disease management training centre at district level for fishermen &amp; Govt. official.</li> </ol>
(iv) Loss of stock and inputs (feed, chemicals etc)	<ol style="list-style-type: none"> <li>1. Cyclone with heavy rain fall situation going to exist then move the feed, chemicals &amp; other accessories to safer places.</li> <li>2. Stock cover under insurance</li> </ol>	<ol style="list-style-type: none"> <li>1. Available fish stock should be recovered.</li> </ol>	<ol style="list-style-type: none"> <li>1. Feeds, chemicals etc required for the culture operation should be purchased.</li> <li>2. Seed and feed to be supplied through Deptt of fisheries,</li> </ol>
(v) Infrastructure damage (pumps, aerators, shelters/huts etc)	<ol style="list-style-type: none"> <li>1) Cyclone with heavy rain fall situation going to exist then shifted the pumps, aerators &amp; other accessories to safer places.</li> </ol>	<ol style="list-style-type: none"> <li>1) Use manual techniques for aeration or make substitute arrangement for the same.</li> </ol>	<p>Compensation on assessment of actual losses &amp; damage of pumps, aerators, shelters/huts given through RKVY, NCDC, NREGSui</p>
(vi) Any other			
<b>4. Heat wave and cold wave</b>			
<b>A. Capture</b>			
Marine			
Inland			
<b>B. Aquaculture</b>			
(i) Changes in pond environment (water quality)	<ol style="list-style-type: none"> <li>1) If intensity of heat wave high, add water from other source.</li> <li>2) Harvest existing fish stock.</li> <li>3) Adequate facility should be ready for heat wave &amp; system for changing water temperature during cold wave.</li> <li>4) Listen to local weather forecasts</li> </ol>	<ol style="list-style-type: none"> <li>1) Adequate facility should be ready for heat wave &amp; system for changing water temperature during cold wave.</li> <li>2) Monitor fishing sites frequently to ensure that they are not affected by heat or cold waves.</li> <li>3) Use dark materials to cover the water bodies during excessive heat waves.</li> <li>4) Stay hydrated by drinking plenty of fluids</li> </ol>	<ol style="list-style-type: none"> <li>1) Adequate facility should be ready for heat wave &amp; system for changing water temperature during cold wave.</li> <li>2) Intensive afforestation program for reducing heat waves.</li> <li>3) Collect basic weather data and incidence of extreme and physical data of water bodies, water chemistry and seasonal</li> </ol>

	<p>and stay aware of upcoming temperature changes.</p> <p>5) Arrange the aerators.</p> <p>6) Ensure sufficient water quantity in water bodies.</p> <p>7) Formulate strategic fishing management for the heat /cold waves.</p> <p>8) Tree plantation around fish ponds</p>	<p>during fishing/field work.</p> <p>5) Adopt proper care and management during the fishing period of cold/heat wave like keeping stock of drinking water and extra cloths.</p> <p>6) Educating the farmers through electronic or print media</p> <p>7) Maintain Water level in pond</p>	<p>changes, plankton profile and seasonal blooms, topography and soil composition.</p> <p>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.</p> <p>5) Loss assessment &amp; insurance claim.</p>
			<p>1) Setting health &amp; disease management training centre at district level for fishermen &amp; Govt. official.</p> <p>2) Laboratory diagnosis of diseased fish, generation of data about type or kind of disease spread.</p> <p>3) Eradicating the disease.</p> <p>4) Follow up surveillance and monitoring.</p> <p>5) Proper disposal of dead fish.</p> <p>6) Loss assessment &amp; insurance claim.</p> <p>7) KMNO<sub>4</sub> 2 % to maintain oxygen level</p>

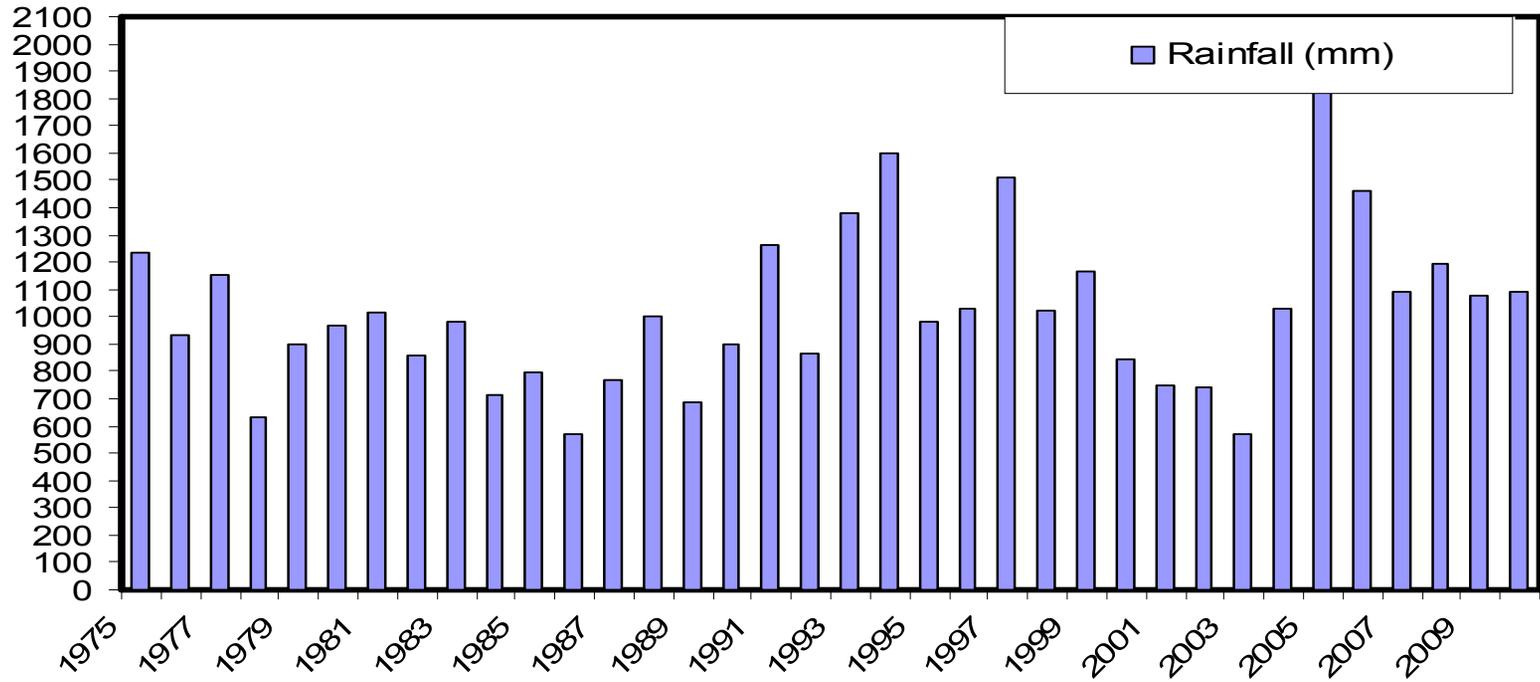
ANNEXURE I (a): Location map of Kolhapur district within the state



ANNEXURE I (b): Map of Kolhapur district

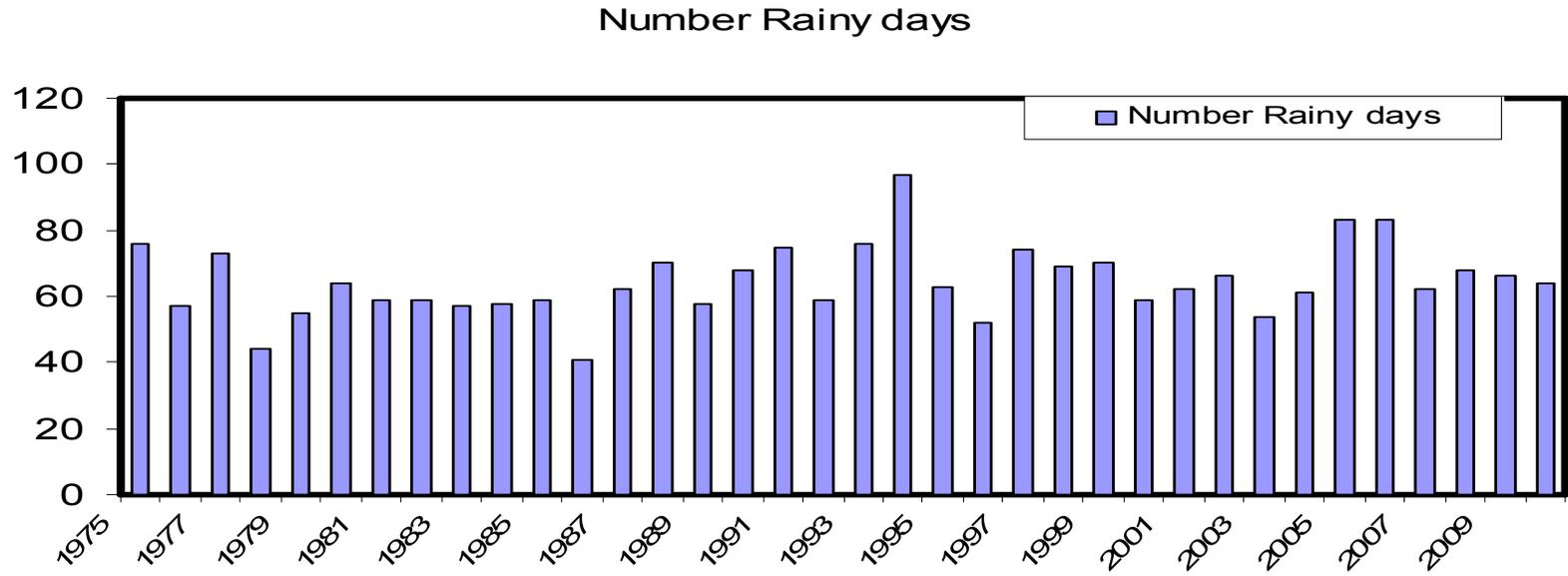


ANNEXURE II (a): Annual rainfall received at ZARS., Kolhapur

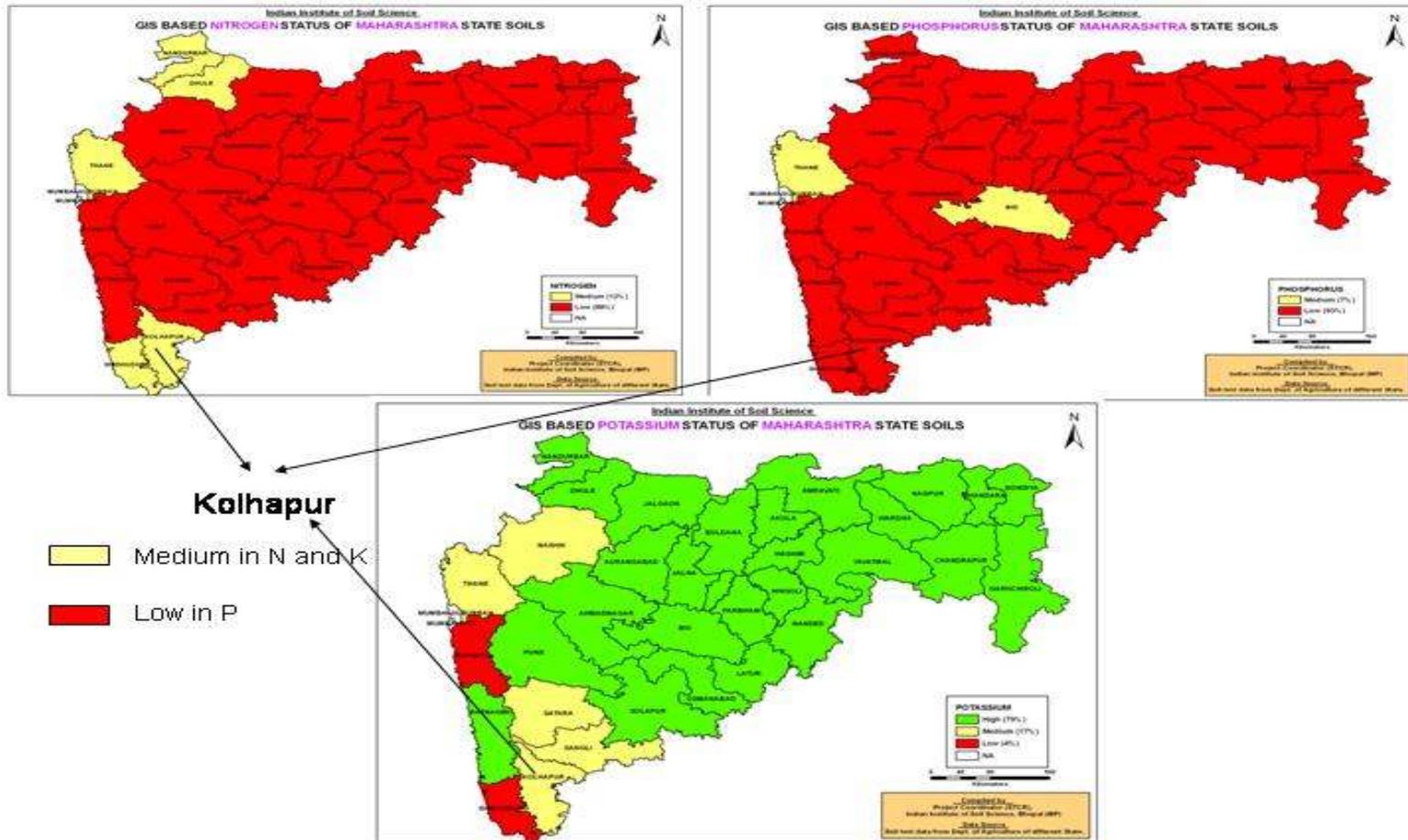


Mean annual rainfall : 1019.5 mm in 65 rainy days

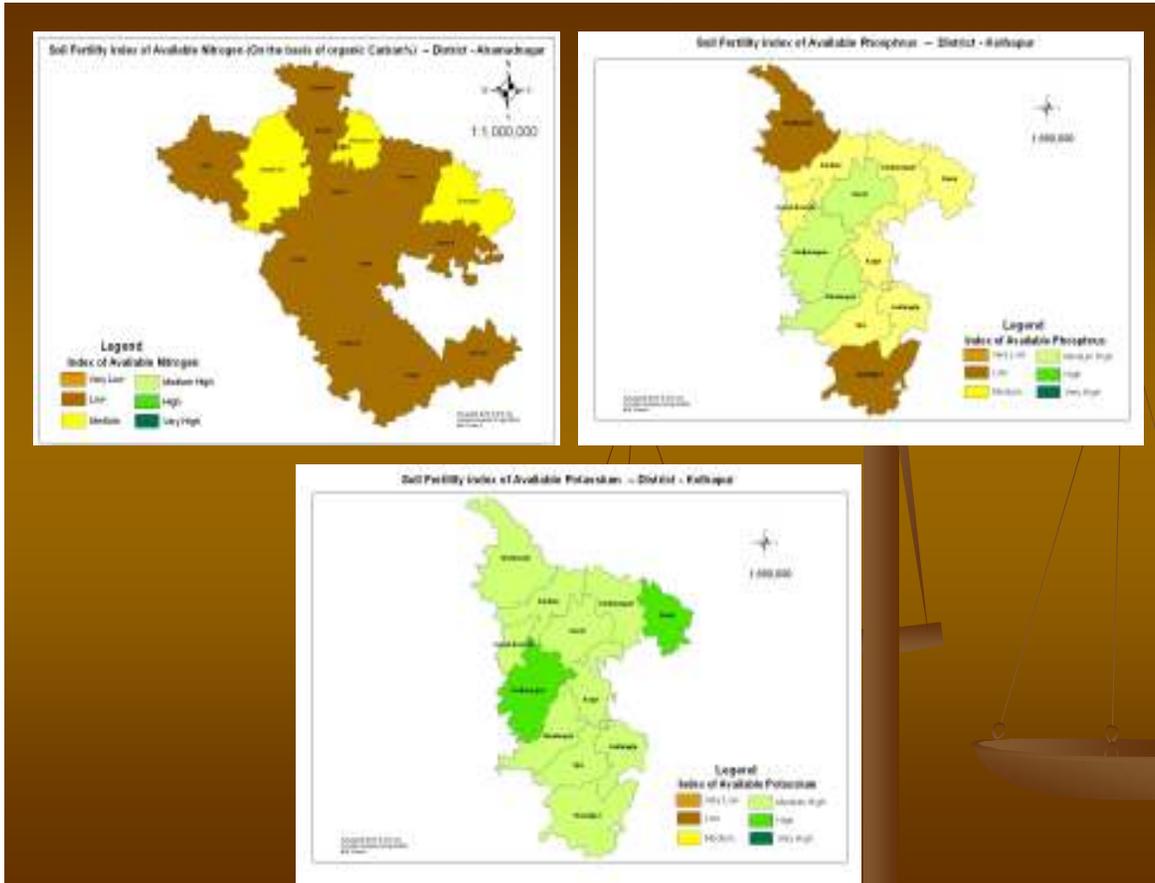
ANNEXURE II (b): Year wise number of rainy days recorded at ZARS., Kolhapur



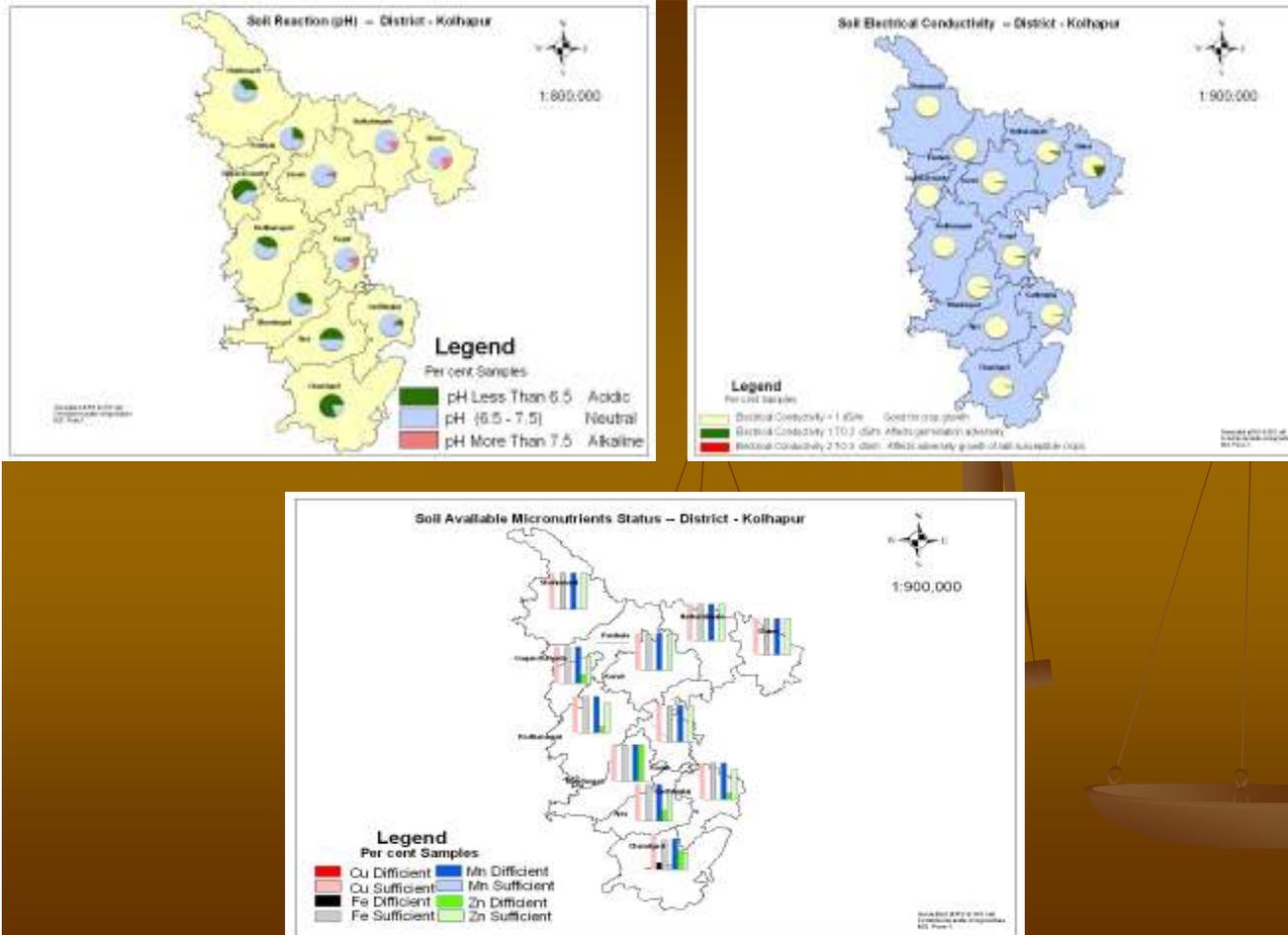
ANNEXURE III (a): Soil map of Kolhapur district



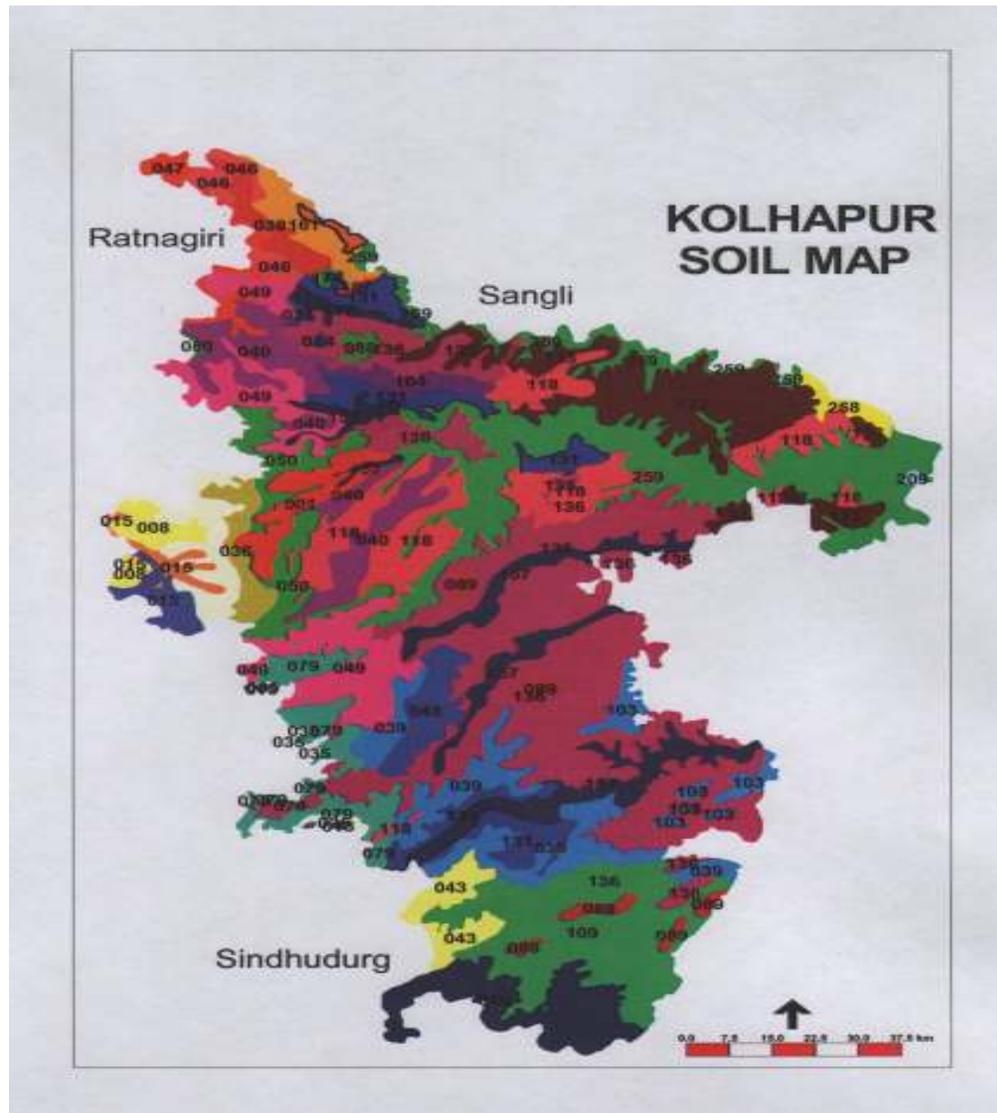
ANNEXURE III (b): Soil fertility map of Kolhapur District.



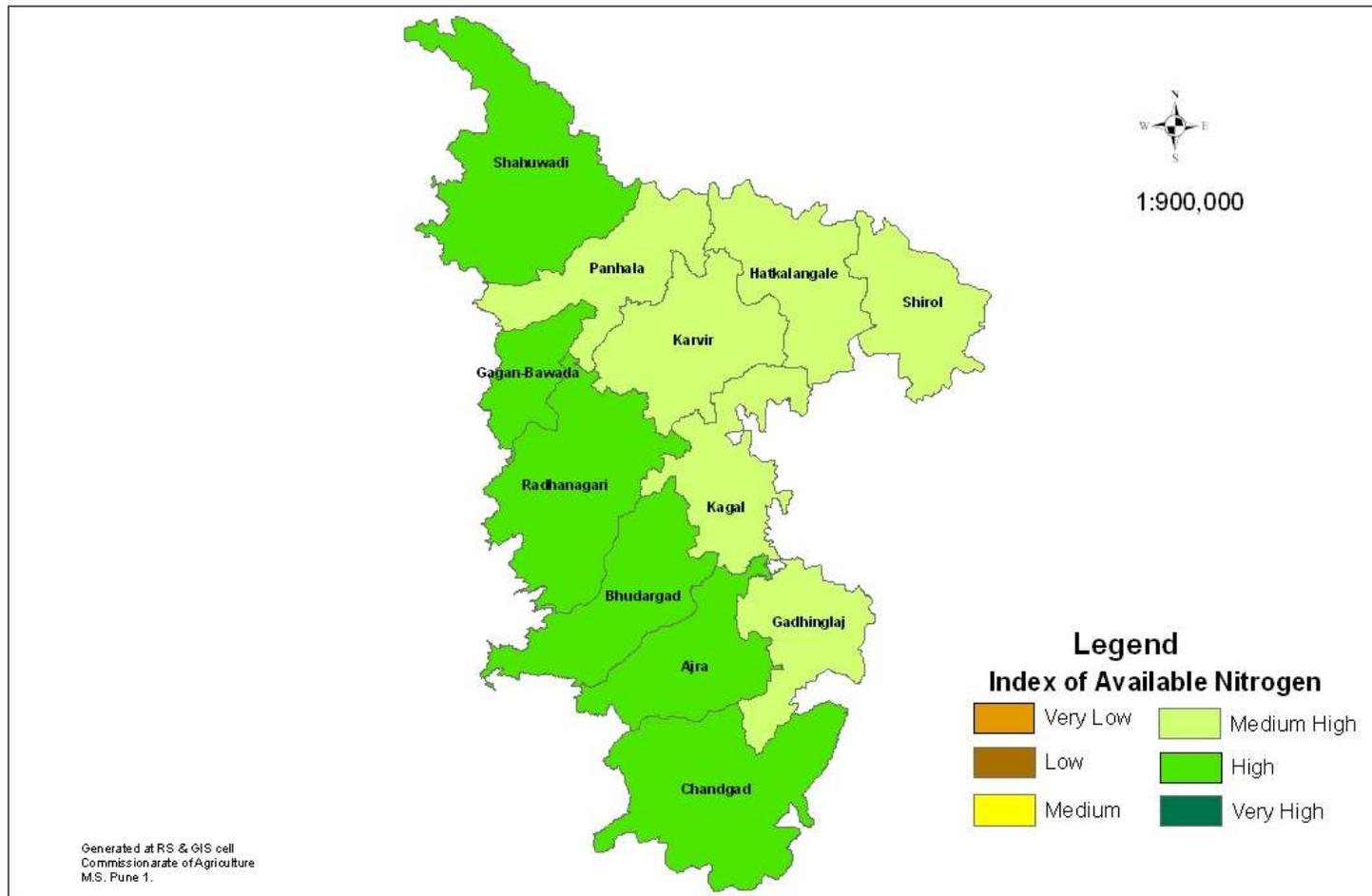
ANNEXURE III (c): Soil pH, EC and micronutrient map of Kolhapur district



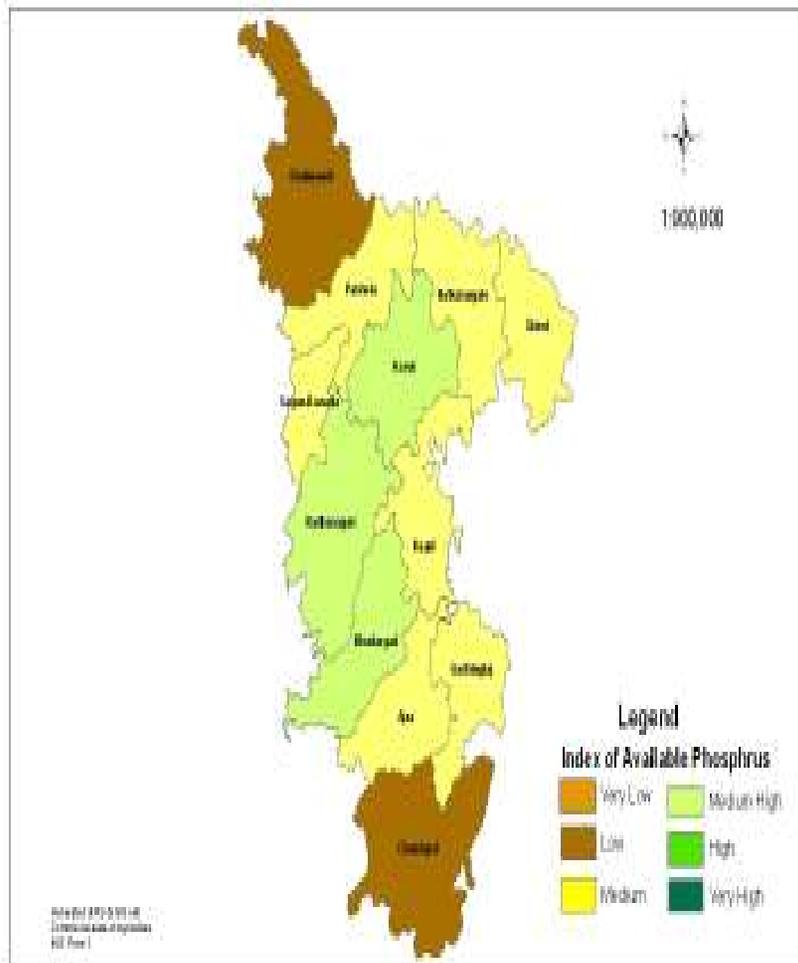
Soil Map of Kolhapur District



### Soil Fertility index of Available Nitrogen (On the basis of organic Carban%) -- District - Kolhapur



### Soil Fertility Index of Available Phosphorus – District - Kolhapur



### Soil Fertility Index of Available Potassium -- District - Kolhapur

