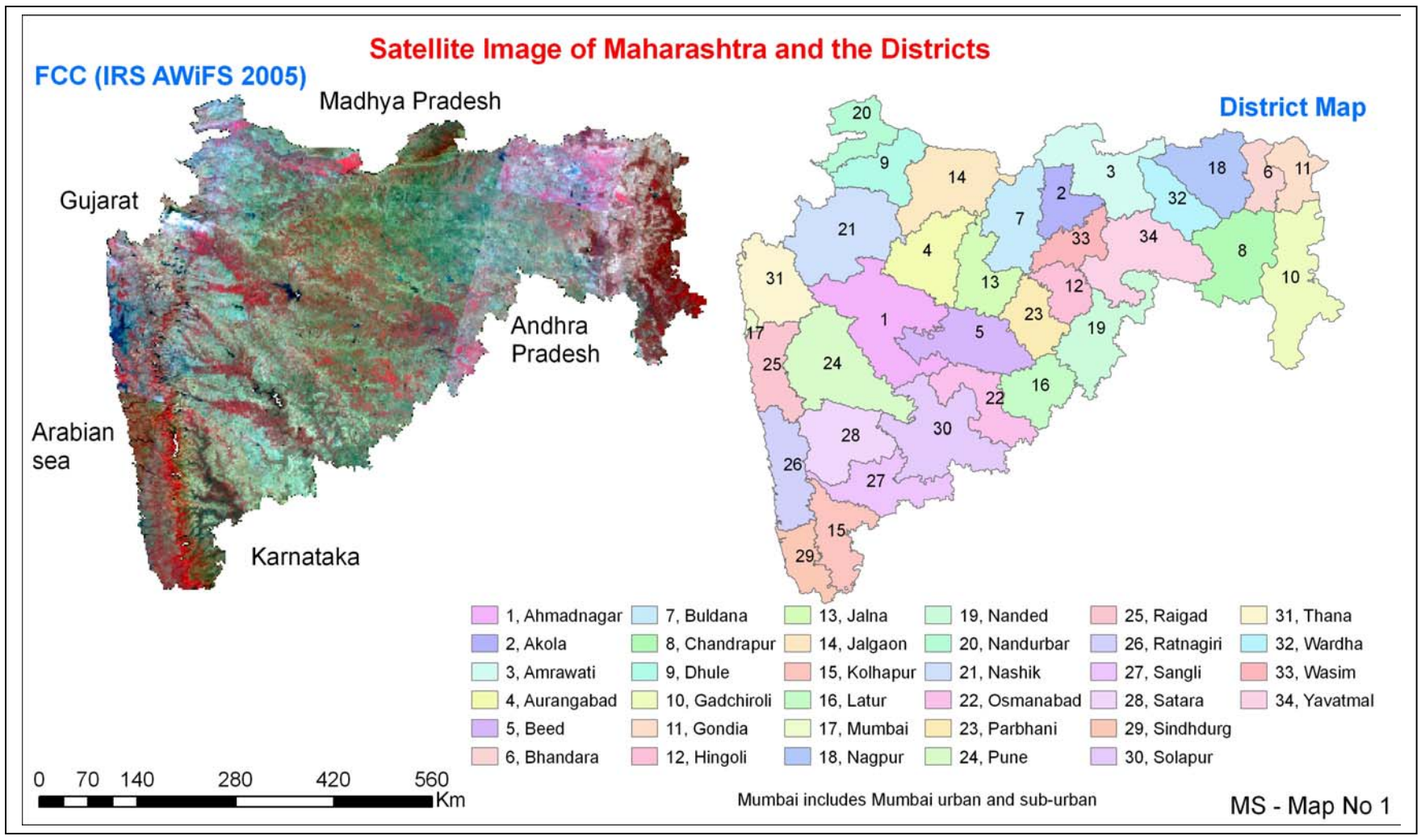
MAHARASHTRA

INTRODUCTION

Location and Administrative Setup: Maharashtra state is India's third largest in terms of area (9.36% of the total geographic area of the country), covers area of 30771.300 Th ha (307713 sq. km) and second largest in terms of population. In contrast to agrarian economy that characterizes India, Maharashtra stands out with highest level of urbanization among all Indian states. Mumbai being its capital is the largest metropolitan city. Other large cities include Pune, Nagpur, Nasik and Aurangabad. It lies between $15^0$35' and $22^0$02' N latitude and $72^0$36' and $80^0$54' E longitude and is bounded in the north by Madhya Pradesh, in the east Chattishgarh, in south-east by Andhra Pradesh, in south by Karnataka and Gujarat in the north. The Arabian Sea makes up Maharashtra's western coast, which is a vast stretch of 720 km. The state consists of 35 districts (Map 1), which are grouped by six divisions. The state consists of 353 sub-districts, 378 towns and 43711 Villages. Mumbai is the state capital.

As per 2001 census total population of the state is 96,752,247, which constitutes 9.42% of the countries population. The population density of the state is relatively higher as (322.5 person/km2) in comparison to national average. Out of the total population males constitute 50.3 million and female 46.4 million. The sex ratio is 922 female per 1000 male. The literacy percentage of the state is 77.27%. Male and female literacy are 86.2% and 67.5% respectively. Since last decade there has been an upward trend in literacy from 64.87% (1991) to 77.27% (2001).



Climate: Maharastra has got variable climate from continental to typical maritime depending upon the location and physiography. The coastal districts of Konkan experience heavy rains but mild winter. The weather, however, is mostly humid throughout the year. The maximum and minimum temperature varies between 27^0C and 40^0C & 14^0C and 27^0C respectively. The maximum summer temperature varies between 36^0C and 41^0C and during winter the temperature oscillates between 10^0C and 16^0C. The average annual rainfall of the state ranges between 1600 to 2000 mm. Rainfall starts in the first week of June and July is the wettest month. Rainfall in Maharashtra differs from region to region.

Land use: Land use statistics for the year 2003–'04 is given in Table 1.

Table 1: Major Land Use (Th ha)

PARTICULARS	2003-'04
Forest	5212.100
Not Available For Cultivation	
A-Land put to Non Agriculture Uses	1361.200
B-Barren and Uncultivable Land	1718.000
Other Uncultivable Land Excluding Fallow Land	
A-Permanent Pastures & Grazing land	1248.700
B-Land under misc. Tree Crops & Groves	251.200
C-Cultivable Wastelands	917.200
Fallow Land	
A-Current Fallow	1363.800
B-Old Fallow	1215.700
Cropped Area	
A-Net Area Sown	17432.400
B-Area Sown More Then Once	1137.100
Gross Cropped Area	18569.500
Cropping Intensity (%)	106.50

(Source: www.indiastat.com)

Satellite Data: IRS P6 LISS III data of two different seasons namely, pre monsoon (April-May, 2004) and post monsoon (November-December, 2003 were used for delineation of waterlogged and salt affected areas of various commands of Maharashtra.

WATER RESOURCES AND COMMAND AREAS

Water Resources: State has 7.08 million hectors of irrigation potential out of which 5.9 million ha is from the surface sources. The State is mainly covered by the basins of Krishna, Godavari and Tapi except the west-flowing rivers of Konkan strip. A small portion on north comes under Narmada basin. There are in all 380 rivers in the State and their total length is 19269 km. The major rivers, which flow through Maharashtra state are Godavari, Krishna and Tapi. Indravati, Wardha, Mnajira, Penganga and Purna are other important rivers. Annual replenishable ground water resources are 32.96 BCM and stage of ground water development is 48%.

Command Areas: There are 349 irrigation commands in Maharashtra. Number of major and medium irrigation commands are 100 and 249, respectively (Map 2).

WATER LOGGING AND SALT AFFECTED AREAS IN MAJOR AND MEDIUM IRRIGATION COMMANDS BASED ON SATELLITE REMOTE SENSING

Total waterlogged area in the state is 426.408 Th ha out of which 11.306 Th ha is perennial and 415.102 Th ha is seasonal. Except two commands all the commands have area under waterlogging category with highest seasonal and perennial waterlogging in Ujani command. Salt affected area covers 34.541 Th ha. Out of 349 commands, 261 commands have no salt affected area. Total 1308 soil samples were collected to check the salinity / alkalinity in the command. Table 2 and Map 3 show the salt affected area and waterlogged areas in major and medium irrigation commands in Maharashtra state.

Table 2: Waterlogged and Salt Affected areas in major and medium irrigation commands of state

Code	Command name	Type	Waterlogged area (Th ha)	Salt affected area (Th ha)
16	Arunawati river project	Major	1.351	0.000
17	Asolamedha talab project	Major	0.374	0.000
18	Asthi upsa sinchan	Major	2.262	0.000
20	Bagh project	Major	0.441	0.085
25	Bakurde upsa sinchan	Major	0.740	0.000
28	Barasgoan	Major	0.016	0.000
29	Barsi upsa sinchan yajana	Major	4.241	0.301
32	Bawan thadi project	Major	0.194	0.000
33	Benbala river project	Major	2.793	0.000
34	Bhama-ashkhed	Major	1.168	0.105
35	Bhandardara project	Major	4.776	2.499
36	Bhatsa project	Major	0.425	0.105
37	Bhima-sina link canal	Major	3.632	0.292
47	Bor river project	Major	2.609	0.027
54	Chanakpur project	Major	0.779	0.254
60	Chaskaman	Major	0.839	0.112
69	Daran	Major	2.562	1.117
71	Demve project	Major	0.256	0.000
74	Dham river project	Major	1.648	0.000
77	Dhangarwadi upsa sinchan	Major	0.004	0.014
79	Dhom	Major	1.755	0.000
80	Dhom balakwadi	Major	0.276	0.019
82	Dina project	Major	0.157	0.000
88	Dudhganga	Major	6.414	0.127
91	Ekruk upsa sinchan	Major	4.756	0.000
94	Gangapur project	Major	2.988	0.561
96	Gasi kurda (indara sagar)	Major	1.567	0.000
98	Ghopewara upsa sinchai yojana	Major	4.638	0.084
99	Ghor	Major	0.890	0.206
104	Girna project	Major	1.706	0.000
105	Godavari lower canal	Major	6.986	0.151
106	Godavari upper canal	Major	13.672	1.381
110	Gunjawani project	Major	0.283	0.025
111	Hanbarwadi upsa sinchan	Major	0.150	0.000
118	Human project	Major	0.093	0.000
119	Itiadoh project	Major	0.344	0.000
126	Janai-shirsaiupsa sinchan	Major	6.911	1.505
128	Jayakwadi (manjal gaon) project	Major	6.444	0.228
129	Jayakwadi (pathan) project	Major	9.598	1.970
130	Jigaon project	Major	5.904	3.717
131	Jihe-kathapur upsa sinchan	Major	2.327	0.003
134	Kadakpurna project	Major	0.062	0.000
142	Kanher	Major	4.294	0.003
149	Karanjwan project	Major	1.582	0.244
151	Karmala (dahigaon) upsa sinchan	Major	2.149	0.107
158	Katepurna project	Major	0.060	0.000
159	Kavthe upsa sinchan	Major	0.011	0.000
162	Khadakvasla	Major	8.377	0.583
170	Khodsi	Major	7.830	0.553
175	Krishna canal	Major	3.743	0.034
176	Krishna-koyana upsa sinchan	Major	6.807	0.001
177	Krishna-koyna	Major	1.365	0.000
181	Kukadi project	Major	11.003	0.753
189	Lodi project	Major	0.596	0.000
192	Lower dudhana project	Major	1.210	0.397
195	Lower penganga project	Major	2.253	0.000
196	Lower terna project	Major	0.953	0.000
197	Lower wana project	Major	5.177	0.009
198	Lower wardha project	Major	3.234	0.001
205	Manar project	Major	4.567	0.264
208	Manik doh	Major	0.185	0.000
210	Manjara project	Major	3.305	0.000
221	Mula project	Major	0.579	0.038
228	Nalganga project	Major	1.622	0.412
235	Nira-devghar	Major	1.428	0.222
248	Pawana	Major	0.136	0.000
249	Pench project	Major	4.662	0.000
253	Pothara nalla project	Major	1.925	0.000
255	Punand project	Major	1.495	0.000
257	Purandar upsa sinchan	Major	0.635	0.000
259	Purna project	Major	29.920	0.776
261	Pus project	Major	1.564	0.946
263	Radhanagri	Major	2.429	0.005
274	Sangola sahkha	Major	0.825	0.001
275	Sangola upsa sinchan	Major	3.189	0.142
285	Shirala upsa sinchan	Major	0.435	0.000
286	Shirapur upsa sinchan	Major	12.007	0.045

Code	Command name	Type	Waterlogged area (Th ha)	Salt affected area (Th ha)
290	Sina kalegoan	Major	0.098	0.000
291	Sina- madha upsa sinchan	Major	0.560	0.008
301	Surya project	Major	0.298	0.000
302	Talamba project	Major	0.030	0.000
304	Tarli	Major	0.147	0.000
307	Tembhu upsa sinchan	Major	3.669	0.000
308	Temghar	Major	0.026	0.000
314	Tulsi	Major	1.757	0.003
315	Tultuli project	Major	0.257	0.000
317	Ujani	Major	34.984	0.203
322	Upper penganga project	Major	27.698	1.001
323	Upper tapi hatnur project	Major	1.624	0.000
324	Upper wardha project	Major	5.288	0.388
325	Urmodi	Major	0.124	0.000
326	Urmodi upsa sinchan	Major	0.508	0.003
332	Varna	Major	12.913	1.793
335	Vilvande dam project	Major	1.070	0.961
336	Vir	Major	20.468	1.341
338	Wadaj	Major	0.200	0.000
341	Waghur project	Major	1.228	0.000
343	Wan river project	Major	0.643	0.000
347	Wangana upsa sinchan	Major	0.146	0.002
348	Wasna upsa sinchan	Major	0.007	0.000
1	Abhora project	Medium	0.025	0.000
2	Adan project	Medium	0.553	0.000
3	Adharpur project	Medium	1.295	0.160
4	Adhela project	Medium	0.013	0.002
5	Agnawati project	Medium	0.008	0.000
6	Alandi project	Medium	0.409	0.000
7	Amalnala project	Medium	0.199	0.063
8	Ambadi project	Medium	0.036	0.000
9	Ambeohol medium project	Medium	0.168	0.000
10	Amravati project	Medium	0.011	0.000
11	Andhra	Medium	0.306	0.000
12	Anjanapalashi project	Medium	0.002	0.000
13	Anjani project	Medium	0.254	0.000
14	Aredh	Medium	0.000	0.000
15	Aruna medium project	Medium	0.013	0.000
19	Babhulgoan	Medium	0.041	0.000
21	Baghad medium project	Medium	1.248	0.066
22	Bagheda tank project	Medium	0.003	0.000
23	Bagholi buti upsa sinchan yojana	Medium	0.038	0.000
24	Bahula project	Medium	0.046	0.569
26	Banganga	Medium	0.183	0.000
27	Banganga project	Medium	0.024	0.000
30	Baspappawadi	Medium	0.177	0.000
31	Baspappawadi upsa sinchan	Medium	0.621	0.000
38	Bhivargi	Medium	0.009	0.000
39	Bhojapur project	Medium	0.182	0.671
40	Bhokar (mangrul) project	Medium	0.074	0.000
41	Bhokarbari project	Medium	0.089	0.291
42	Bhotekar bothali project	Medium	0.004	0.000
43	Bindusara project	Medium	0.069	0.000
44	Bodalkasa project	Medium	0.099	0.000
45	Bodhegaon project	Medium	0.054	0.000
46	Bor goan project	Medium	0.025	0.000
48	Borgaon project	Medium	0.229	0.000
49	Bori	Medium	1.844	0.000
50	Bori project	Medium	0.039	0.000
51	Borna project	Medium	0.015	0.000

Code	Command name	Type	Waterlogged area (Th ha)	Salt affected area (Th ha)
	Budhihal	Medium	0.620	0.000
53	Burai medium project	Medium	0.014	0.000
55	Chandai project	Medium	0.082	0.000
56	Chandani	Medium	0.034	0.000
57	Chandrabhaga project	Medium	0.153	0.000
58	Chandrabhaga river project	Medium	0.395	0.000
59	Chargaon project	Medium	0.079	0.000
61	Chenna river project	Medium	0.014	0.000
62	Chikhlagi	Medium	0.402	0.000
63	Chikotra	Medium	0.320	0.000
64	Chilewari medium	Medium	0.047	0.000
65	Chitri	Medium	1.476	0.039
66	Chorkhamara tank project	Medium	0.089	0.000
67	Chulband tank project	Medium	0.086	0.000
68	Dara medium project	Medium	0.105	0.000
70	Dehli medium project	Medium	0.254	0.000
72	Deoghar project	Medium	0.028	0.000
73	Devrajan project	Medium	0.147	0.056
75	Dhaman project	Medium	0.215	0.000
76	Dhamni	Medium	0.035	0.000
78	Dharni project	Medium	0.513	0.000
81	Dhubdhubi	Medium	1.148	0.000
83	Dodha nala	Medium	0.024	0.000
84	Dokewadi project	Medium	0.408	0.004
85	Dongargaon project	Medium	0.039	0.000
86	Dongargaon tank project	Medium	0.083	0.000
87	Dorang gaon medium project	Medium	0.029	0.000
89	Ekburji project	Medium	0.566	0.000
90	Ekruk	Medium	2.823	0.005
92	Gad river project	Medium	0.004	0.000
93	Galhati project	Medium	0.050	0.096
95	Garadgarh project	Medium	0.006	0.000
97	Ghatprabha	Medium	0.010	0.000
100	Ghorazari project	Medium	0.145	0.000
101	Ghyanganga project	Medium	0.810	0.000
102	Giri project	Medium	0.102	0.000
103	Girija project	Medium	0.016	0.000
107	Goki project	Medium	0.777	0.000
108	Gomai project	Medium	0.263	0.000
109	Gul river project	Medium	0.150	0.000
112	Haranbari medium project	Medium	0.321	0.000
113	Hetawane medium project	Medium	2.306	4.507
114	Hingni	Medium	0.082	0.000
115	Hiranyakeshi sarfnalla project	Medium	0.043	0.000
116	Hirni	Medium	0.411	0.000
117	Hivra project	Medium	0.063	0.000
120	Jadhavbari	Medium	0.014	0.000
121	Jagamhatti	Medium	0.021	0.000
122	Jakapur	Medium	0.190	0.000
123	Jam river project	Medium	0.426	0.000
124	Jambare	Medium	0.098	0.000
125	Jamkhedi medium project	Medium	0.227	0.006
127	Jawalgoan	Medium	0.017	0.000
132	Jivrekha project	Medium	0.028	0.000
133	Jui project	Medium	0.149	0.000
135	Kadeshwar	Medium	0.602	0.000
136	Kadvi	Medium	1.081	0.000
137	Kalmadi	Medium	0.053	0.000
138	Kalpathari project	Medium	0.017	0.000
139	Kalyan girja project	Medium	0.029	0.000
140	Kalyan project	Medium	0.146	0.000
141	Kambli project	Medium	0.001	0.000

Code	Command name	Type	Waterlogged area (Th ha)	Salt affected area (Th ha)
	Kanholi nalla project	Medium	0.152	0.000
144	Kanoli medium project	Medium	0.024	0.000
145	Kar river project	Medium	0.709	0.000
146	Kara	Medium	0.001	0.000
147	Karadkher medium project	Medium	0.168	0.000
148	Karajkhada upsa sinchan yojana	Medium	0.021	0.000
150	Kari	Medium	0.000	0.000
152	Karpara project	Medium	0.285	0.000
153	Karvand project	Medium	0.428	0.000
154	Karwafa nalla project	Medium	0.037	0.000
155	Kasari	Medium	1.246	0.000
156	Kasarsai	Medium	0.071	0.000
157	Katanki tank project	Medium	0.052	0.000
160	Kelzar project	Medium	0.419	0.000
161	Kesarnala project	Medium	0.031	0.000
163	Khairbandha project	Medium	0.054	0.000
164	Khairi	Medium	0.080	0.000
165	Khairi- nim	Medium	0.083	0.000
166	Khandala	Medium	0.101	0.000
167	Khasapur	Medium	0.095	0.000
168	Khekra nallah project	Medium	0.019	0.000
169	Khelana project	Medium	0.046	0.000
171	Kohli project	Medium	0.024	0.000
172	Kolar medium project	Medium	0.430	0.000
173	Koradi project	Medium	0.240	0.000
174	Kordi project	Medium	0.374	0.000
178	Kudala medium project	Medium	0.187	0.011
179	Kudali	Medium	0.029	0.000
180	Kudalika project	Medium	0.283	0.000
182	Kumbhi	Medium	0.687	0.000
183	Kundarala medium project	Medium	0.180	0.000
184	Kurnur	Medium	0.024	0.000
185	Labhansarad project	Medium	0.796	0.000
186	Lahuki project	Medium	0.004	0.000
187	Lall nalla project	Medium	0.932	0.000
188	Landhanala (tulsi)	Medium	0.688	0.000
190	Loni medium project	Medium	0.132	0.000
191	Lower chulband project	Medium	0.116	0.000
193	Lower godawari (vishnupuri) project	Medium	4.400	Negligible
194	Lower panzra (akkalpada) project	Medium	0.110	0.000
199	Madan tank project	Medium	0.182	0.000
200	Mahalingi medium project	Medium	0.274	0.000
201	Mahasvad	Medium	0.290	0.063
202	Malangaon project	Medium	0.131	0.000
203	Man project	Medium	1.247	0.000
204	Managarh tank project	Medium	0.039	0.000
206	Mangi talab upsa sinchan	Medium	0.023	0.000
207	Mangitalab	Medium	0.059	0.000
209	Manikpunj project	Medium	0.044	0.000
211	Manyad dam project	Medium	0.338	0.008
212	Mas project	Medium	0.833	0.000
213	Mastaga project	Medium	0.473	0.000
214	Mehakari project	Medium	0.002	0.000
215	Mod ohal medium project	Medium	0.016	0.043
216	Mor river project	Medium	0.083	0.000
217	Mordham project	Medium	0.017	0.000
218	Morna	Medium	0.107	0.000
219	Morna project	Medium	0.699	0.000
220	Morna-gureghar	Medium	0.274	0.000
222	Muleshi	Medium	0.302	0.000

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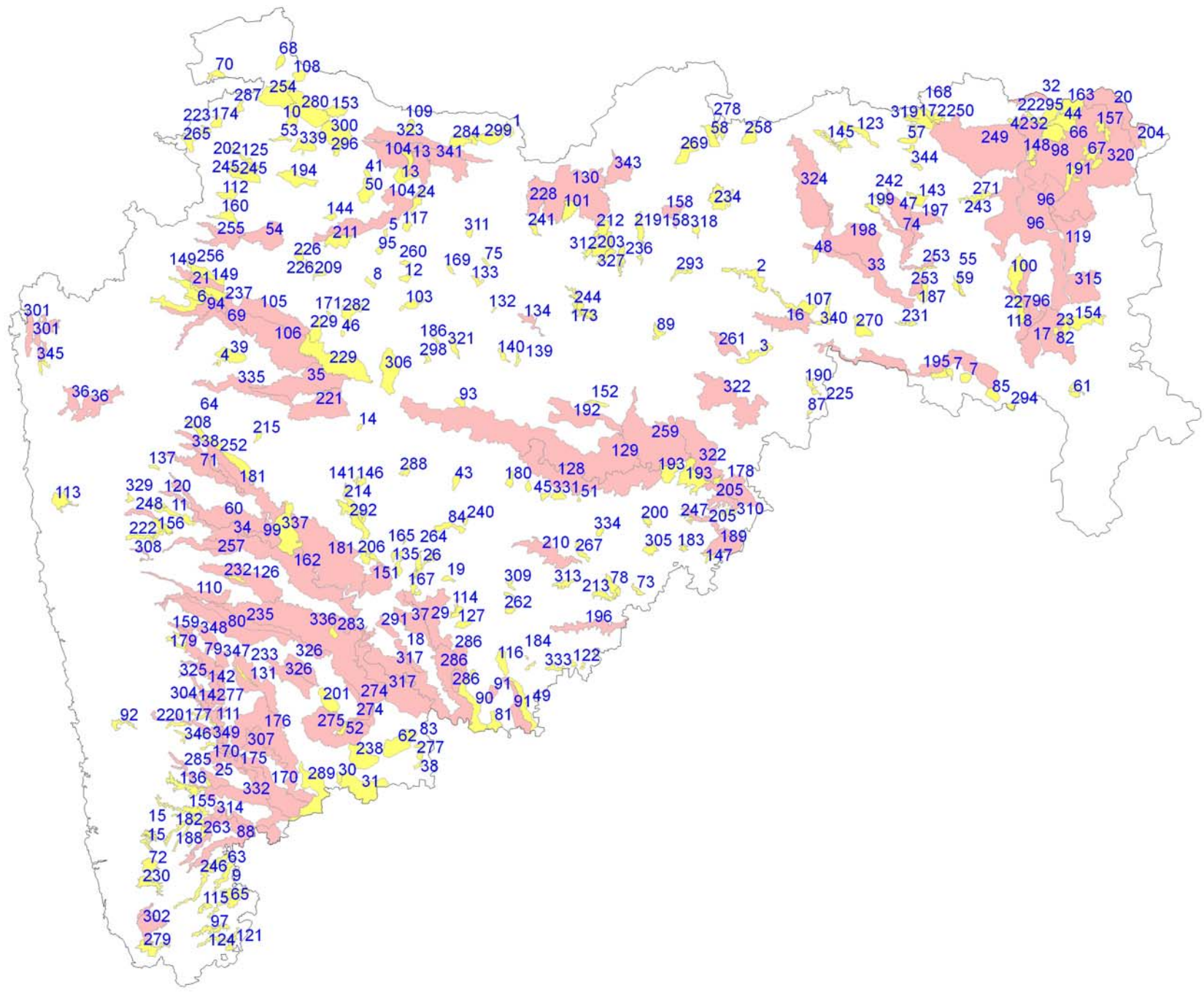
Code	Command name	Type	Waterlogged area (Th ha)	Salt affected area (Th ha)
	Nagan project	Medium	0.254	0.000
224	Nagevadi	Medium	0.004	0.000
225	Nagjhari medium project	Medium	0.014	0.000
226	Nagya-sakya medium project	Medium	0.194	0.000
227	Naleshwar project	Medium	0.051	0.000
229	Narangi project	Medium	2.279	0.000
230	Narelve project	Medium	0.009	0.000
231	Navargaon project	Medium	0.121	0.000
232	Nazare	Medium	1.091	0.155
233	Ner medium project	Medium	0.626	0.000
234	Nima pedhi project	Medium	0.049	0.000
236	Nirguna project	Medium	0.490	0.000
237	Ojharkhand medium project	Medium	1.093	0.000
238	Padvalkarbadi	Medium	0.229	0.000
239	Pakdiguddum tank project	Medium	0.056	0.000
240	Palashwadi project	Medium	0.012	0.000
241	Paldhag project	Medium	0.135	0.000
242	Panchdhara project	Medium	0.124	0.000
243	Pandharabori tank project	Medium	0.283	0.000
244	Pantakali project	Medium	0.542	0.000
245	Panzra project	Medium	0.268	0.000
246	Patgoan	Medium	1.341	0.000
247	Pathwadaj medium project	Medium	0.279	Negligible
250	Pendhri nalla project	Medium	0.004	0.000
251	Pimpalgaon dhale	Medium	0.044	0.000
252	Pimpalgaon joge	Medium	0.384	0.000
254	Prakash barrage	Medium	0.545	0.000
256	Pungaon medium project	Medium	0.220	0.001
258	Purna medium project	Medium	0.162	0.008
260	Purnanevpur project	Medium	0.012	0.000
262	Rade project	Medium	0.129	0.000
264	Ramganga	Medium	0.151	0.000
265	Rangavali project	Medium	0.191	0.000
266	Rangepar tank project	Medium	0.034	0.000
267	Renapur project	Medium	0.221	0.000
268	Ruti	Medium	Negligible	0.000
269	Sahanupur talab project	Medium	0.544	0.846
270	Saikheda project	Medium	0.521	0.000
271	Saiki project	Medium	2.034	0.000
272	Sakat	Medium	0.070	0.000
273	Sakola project	Medium	0.089	0.000
276	Sangrampur project	Medium	0.019	0.000
277	Sankha	Medium	0.123	0.000
278	Sapan project	Medium	0.286	0.000
279	Sarambala project	Medium	0.009	0.000
280	Sarangkheda barrage	Medium	0.246	0.000
281	Saraswati project	Medium	0.044	0.000
282	Sasgaon project	Medium	0.039	0.000
283	Setphal talab	Medium	0.430	0.000
284	Shelgaon project	Medium	0.370	0.000
287	Shivan medium project	Medium	0.084	0.000
288	Sidfana project	Medium	0.070	0.000
289	Sidhewari	Medium	2.734	0.187
292	Sina-nimgoan	Medium	0.019	0.000
293	Sonal project	Medium	0.187	0.000
294	Sonapur tomta upsa sinchan yojana	Medium	0.020	0.000
295	Sondyatola upsa sinchan yojana	Medium	0.042	0.000
296	Sonwad project	Medium	0.131	0.000
297	Sorna tank project	Medium	0.003	0.000

Code	Command name	Type	Waterlogged area (Th ha)	Salt affected area (Th ha)
298	Sukhna project	Medium	0.018	0.000
299	Suki river project	Medium	0.356	0.015
300	Sulvade barrage	Medium	0.105	0.090
303	Talwar	Medium	0.002	0.000
305	Teeru project	Medium	0.142	0.000
306	Tembhapuri project	Medium	0.118	0.054
309	Terna project	Medium	0.116	0.000
310	Tilani project	Medium	0.083	0.000
311	Tondapur project	Medium	0.036	0.000
312	Toran project	Medium	0.143	0.000
313	Tovarja project	Medium	0.508	0.000
316	Turori	Medium	0.132	0.000
318	Uma project	Medium	0.085	0.000
319	Umari project	Medium	0.041	0.000
320	Umarzari nalla project	Medium	0.042	0.000
321	Upper dudhna project	Medium	0.061	0.000
327	Utavali project	Medium	0.417	0.000
328	Uttarmand	Medium	0.835	0.000
329	Vadibale	Medium	0.138	0.000
330	Vagholi project	Medium	0.098	0.001
331	Van project	Medium	0.379	0.165
333	Venitura	Medium	0.090	0.039
334	Vhati project	Medium	0.140	0.000
337	Visapur	Medium	0.622	0.182
339	Wadi shewadi project	Medium	0.071	0.000
340	Waghadi project	Medium	0.543	0.000
342	Wakoda project	Medium	0.005	0.010
344	Wana project	Medium	0.036	0.000
345	Wandri project	Medium	0.072	0.000
346	Wang	Medium	0.415	0.000
349	Yavti	Medium	0.078	0.000
	Total		**426.408**	**34.541**

Distribution of Major and Medium Irrigation Commands in Maharashtra



1 Major comamnd areas with code

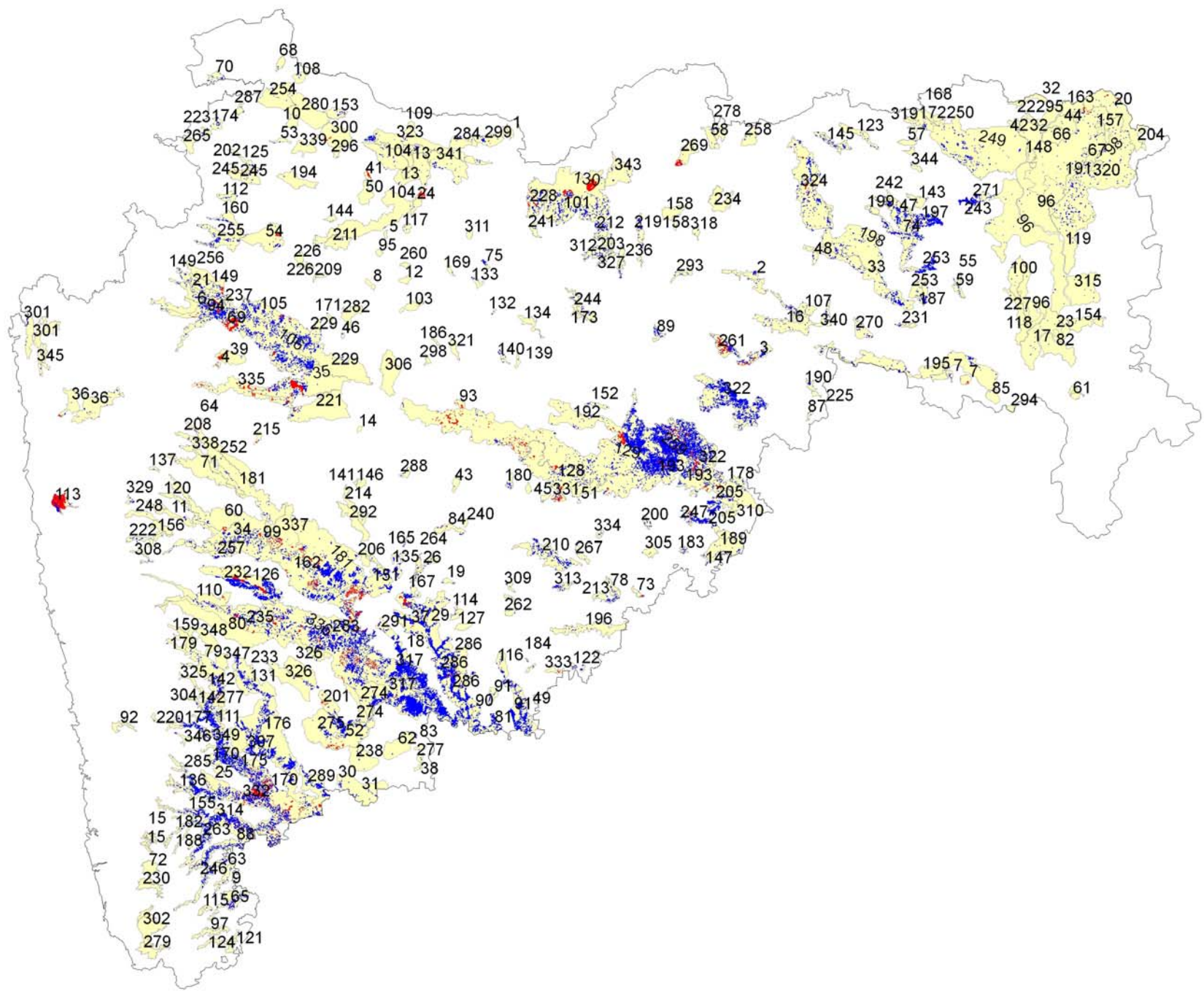
101 Medium comamnd areas with code

0 35 70 140 210 280 Kms

MS - Map No 2

Source: Irrigation Department, Maharashtra

Waterlogged and Salt Affected Areas in the Commands of All Major and Medium Irrigation Projects of Maharashtra Using Satellite Remote Sensing



Salt Affected Area
Waterlogged Area
Command Area

0 35 70 140 210 280 Kms

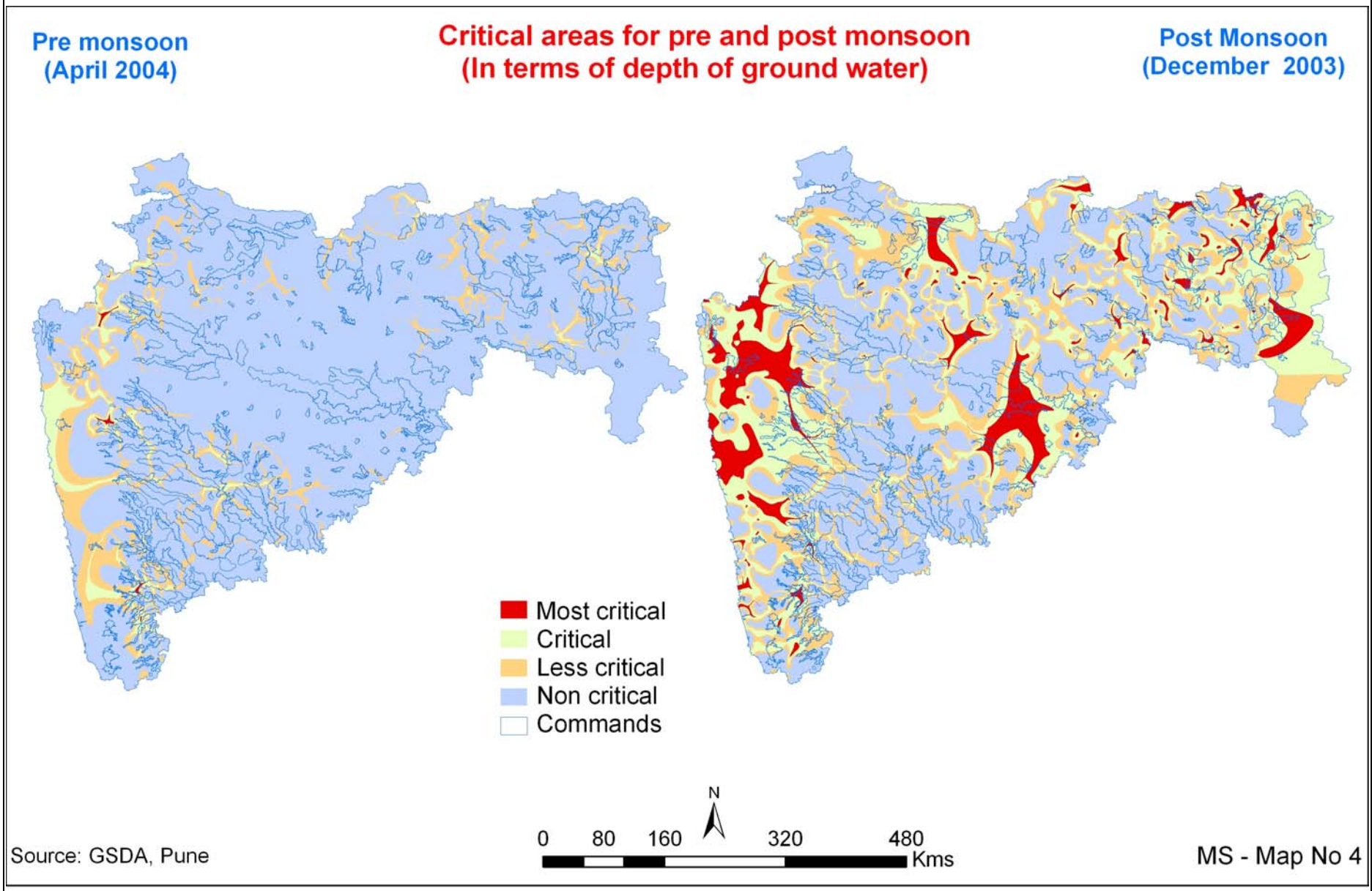
MS - Map No 3

Source: RRSSC/ISRO Jodhpur

For demarcation of critical waterlogged areas due to rise in water table depth, ground water table data of monitoring stations of CGWB were used. Table 3 and Map 4 show the critical area of depth of ground water for pre (April, 2004) and post (December, 2003) monsoon.

Table 3: Critical Area of Depth of Ground Water for Pre (April, 2004) and Post (December, 2003) Monsoon

	Most critical (< 1m)		Critical (1 – 2 m)		Less critical (2 – 3 m)		Non-critical (> 3 m)	
	(Th ha)	(%)	(Th ha)	(%)	(Th ha)	(%)	(Th ha)	(%)
Pre Monsoon (April, 2004)	4.690	0.06	167.210	2.18	758.690	9.86	6765.630	87.90
Post Monsoon (December, 2003)	415.940	5.40	1701.640	22.11	1693.040	22.00	3886.210	50.49



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