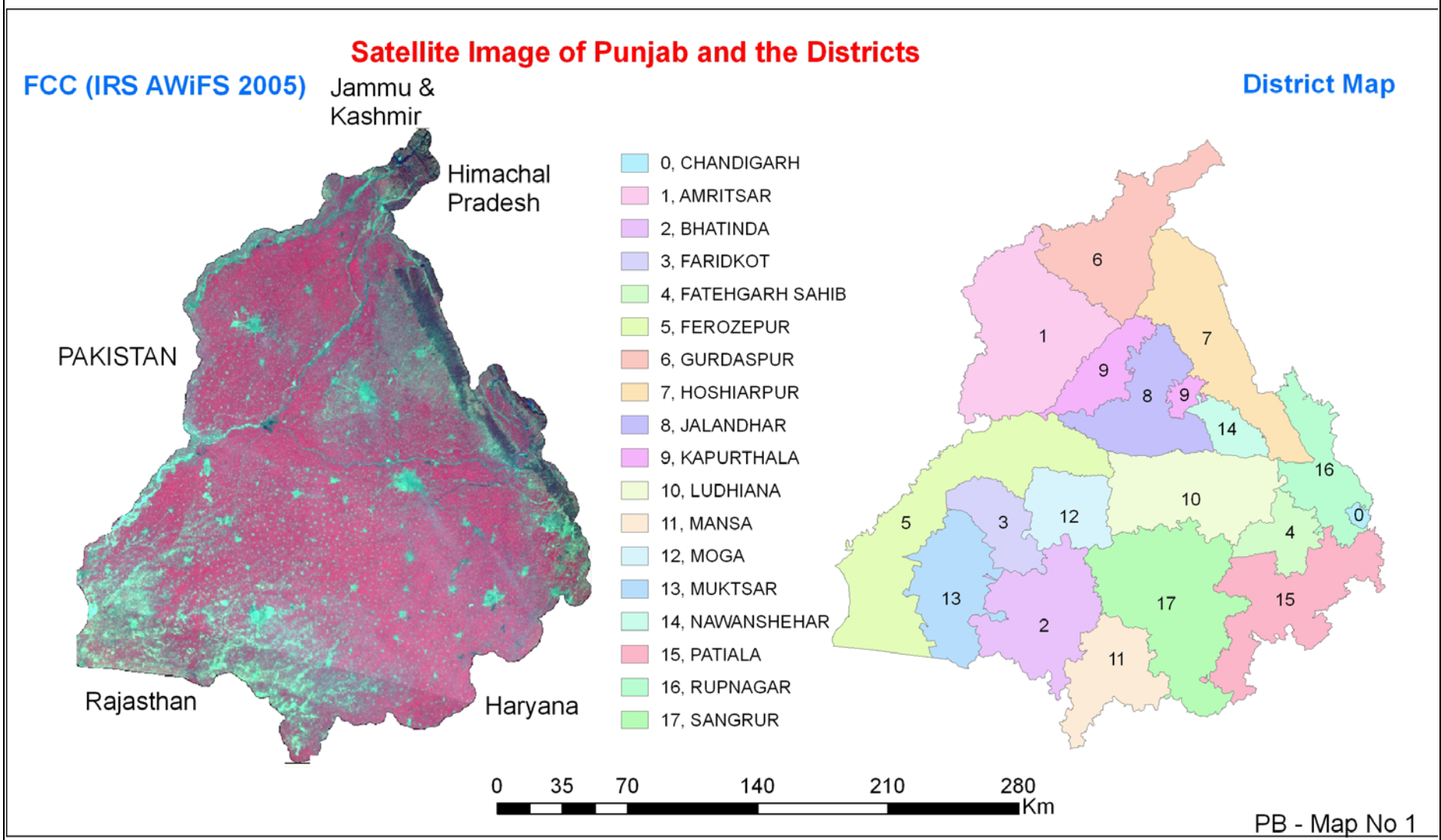
PUNJAB

INTRODUCTION

Location and Administrative Setup: Punjab, one of the smallest states of India, is located between 29° 32' to 32° 32' N latitude and 73° 55' to 76° 50' E longitude covering an area of 5036.200 Th ha (50362 sq. km) which is 1.54% of the total area of the country. It is bounded by Pakistan in the west, Jammu and Kashmir in the north, Himachal Pradesh in the north and northeast, Haryana in the east and southeast and Rajasthan in the southwest. The state has 17 administrative districts (Map 1) with 72 tehsils, 141 blocks, 157 towns and 12,673 villages. Chandigrah is the state capital.

According to 2001 census, total population of the state is 2,43,58,999 out of which about 66.1% rural. The state has population density of 482 persons/sq km. The overall sex ratio is 876 i.e. 876 females per 1000 males. The state has over the years, registered a growth rate higher than the national average. However, as a result of massive programme of family welfare and planning, the growth rate has arrested marginally in the last decade (1991-2001). Birth rate recorded in 2002 was 20.8/thousand. The state has overall literacy rate of 70%, with male literacy rate as 75.90% and female literacy rate as 64%.



Climate: The subtropical continental location of Punjab reflects in its climate that varies from extremely hot and dry during the summer season to fairly cold and dry during the winter season. The lowest temperature during the cooler months of December and January is 5^0C, and in the summer months of May and June the temperature reaches 44^0C. Most parts of the state in summer are hot and humid. State of Punjab receives most of the rainfall from southwest monsoon, in the months of June to October. Average rainfall varies from 100 to 800 mm in different parts of state. Average annual rainfall for the state is 435.6 mm. More than 70% of the rainfall occurs in the months of July and August. The sub-Shiwalik region receives considerable amount of rainfall from December to March. It decreases gradually towards western side of the region. An important characteristic of the rainfall in Punjab is that it is highly variable in time and space.

Land use: Land use statistics for the year 2002-'03 and 2003-'04 is given in Table 1.

Table 1: Major Land Use (In Th ha)

PARTICULARS	2002-'03	2003-'04
Forest	277.000	293.000
Not Available for Cultivation		
A-Land put to Non Agriculture Uses	417.000	437.000
B-Barren and Uncultivable Land	37.000	33.000
Other Uncultivable Land Excluding Fallow Land		
A-Permanent Pastures & Grazing Land	5.000	4.000
B-Land under Misc. Tree Crops & Groves	5.000	4.000
C-Cultivable Wastelands	6.000	13.000
Fallow Land	62.000	49.000
Cropped Area		
A-Net Area Sown	4224.000	4201.000
B-Area Sown More Then Once	3602.000	3704.000
Gross Cropped Area	7826.000	7905.000
Cropping Intensity (%)	185.30	188.20

(Source: www.indiastat.com)

Satellite Data: IRS 1D/P6 LISS III data of two different seasons namely, pre monsoon (May, 2004) and post monsoon (November, 2003) were used for delineation of waterlogged and salt affected areas of various commands of Punjab.

WATER RESOURCES AND COMMAND AREAS

Water Resources: Punjab state has a vast network of canal infrastructure with an approximate length of 14,500 Km. Canal as well as tube well irrigation play crucial role in the state. It is only in the sub-Siwalik belt covering most of Rupnagar, Hoshiarpur and parts of Gurdaspur and Patiala districts that canal irrigation is not developed. Canals are the dominant means of irrigation in the western half of the state. In central Punjab, canal irrigation is important but the area is irrigated with tube wells also. Canal irrigation is almost absent in the foothill districts of the state because of higher level and undulating nature of the land surface.

The total water resources available in the state are 31 Lacs Hectare metre out of which surface canals provide 14.5 Lacs Hectare metre and ground water recharge (rains ands canal seepage) provides 16.8 Lacs Hectare metre of water. The Annual gross replenishable ground water resources in Punjab state is 18192 MCM.

Command Areas: There are 8 irrigation commands in Punjab. Number of major and medium irrigation commands are 6 and 2, respectively (Map 2).

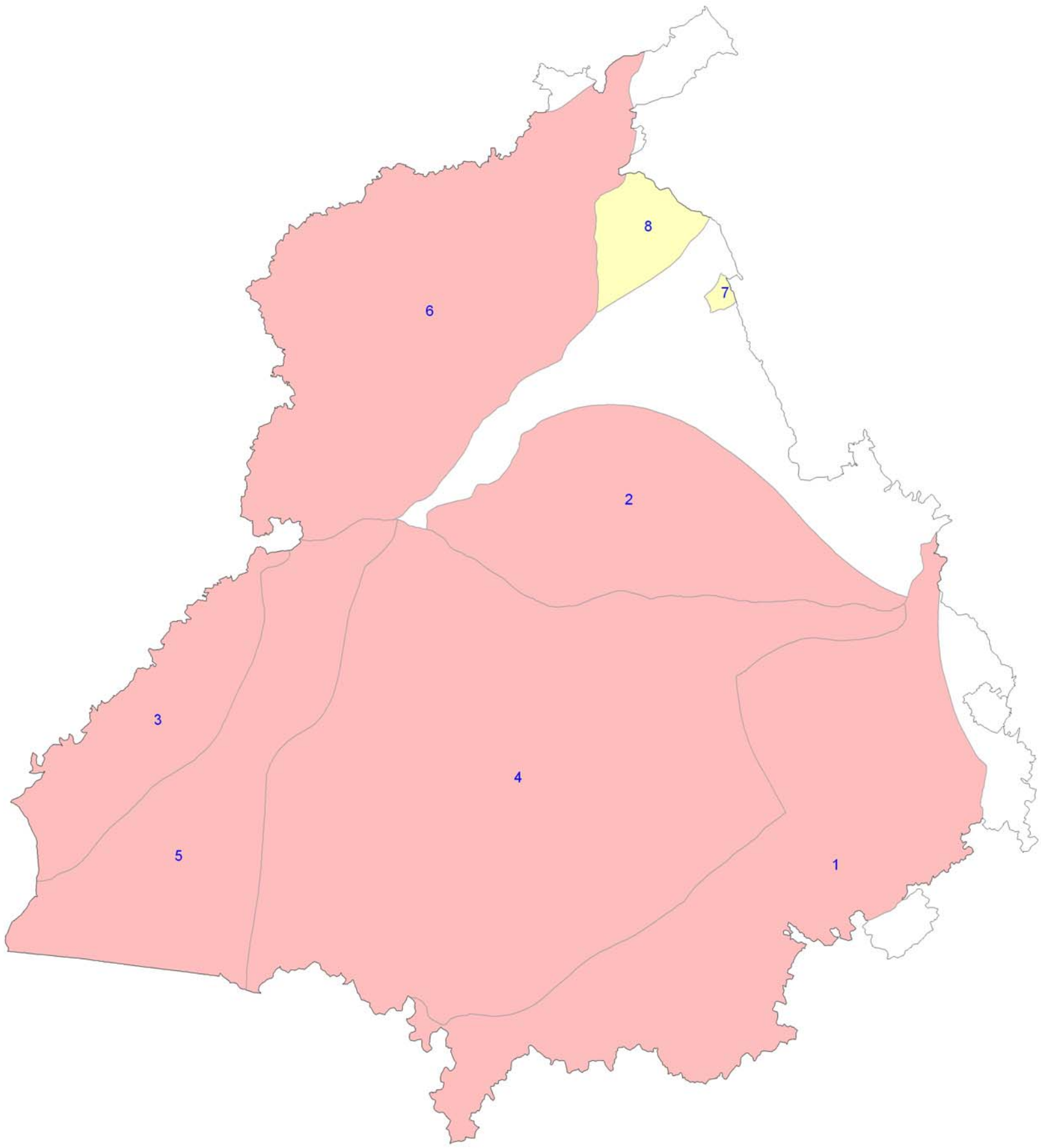
WATER LOGGING AND SALT AFFECTED AREAS IN MAJOR AND MEDIUM IRRIGATION COMMANDS BASED ON SATELLITE REMOTE SENSING

Total waterlogged area in the state is 34.970 Th ha out of which 1.623 Th ha is perennial and 33.347 Th ha is seasonal. It includes surface inundation as well as saturated soil. Except Dholaba dam command, all commands have area under waterlogging category with highest being in Upper Bari Doab canal system. Salt affected area covers 131.998 Th ha out of which 75.716 Th ha is under moderate saline-sodic soil. Total 965 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 Punjab state.

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

Code	Command name	Type	Waterlogged area (Th Ha)	Salt affected area (Th Ha)
1	Bhakra Main Line (B.M.L.) System	Major	3.893	30.879
2	Bist Doab Canal System	Major	1.207	3.353
3	Eastern Canal System	Major	5.859	10.286
4	Sirhind Canal System	Major	6.110	57.937
5	Sirhind Feeder System	Major	7.249	22.268
6	Upper Bari Doab Canal (U.B.D.C.) System	Major	10.371	6.973
7	Dholaba Dam	Medium	0.000	0.000
8	Shah Nehar Canal System	Medium	0.280	0.302
	Total		**34.970**	**131.998**

Distribution of Major and Medium Irrigation Commands in Punjab



1 Major comamnd areas with code

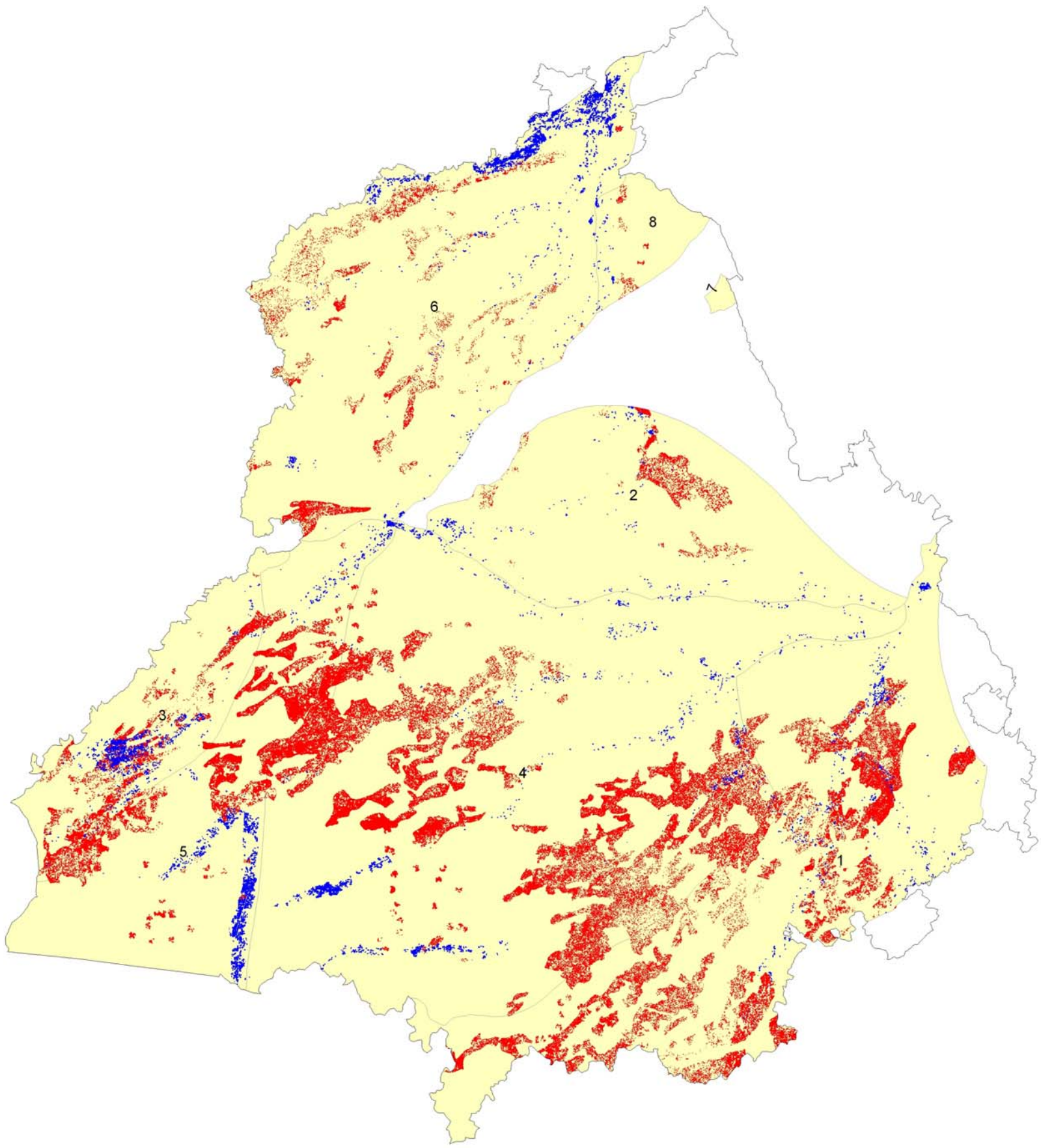
7 Medium comamnd areas with code

0 15 30 60 90 120 Kms

PB - Map No 2

Source: Irrigation Department, Punjab

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



Salt Affected Area
Waterlogged Area
Command Area

0 15 30 60 90 120 Kms

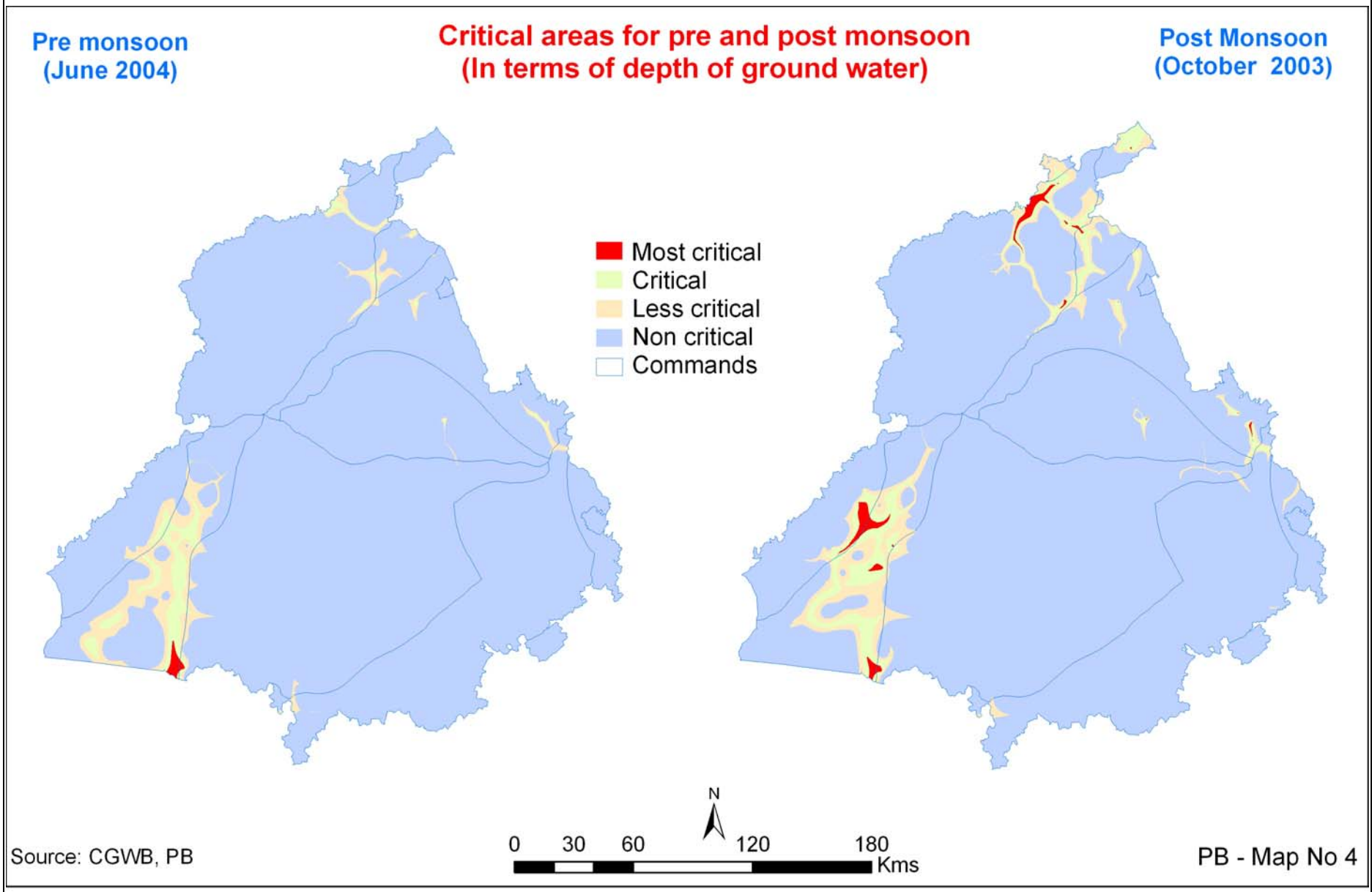
PB - Map No 3

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 (June, 2004) and post (October, 2003) monsoon.

Table 3: Critical Area of Depth of Ground Water for Pre (June, 2004) and Post (October, 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 (June, 2004)	7.388	0.17	90.772	2.03	197.184	4.41	4175.847	93.39
Post Monsoon (October, 2003)	28.545	0.64	155.860	3.49	210.635	4.71	4076.150	91.16



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Soil Sample Collection and Analysis support by IEMSD, Jodhpur

Acknowledgements

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