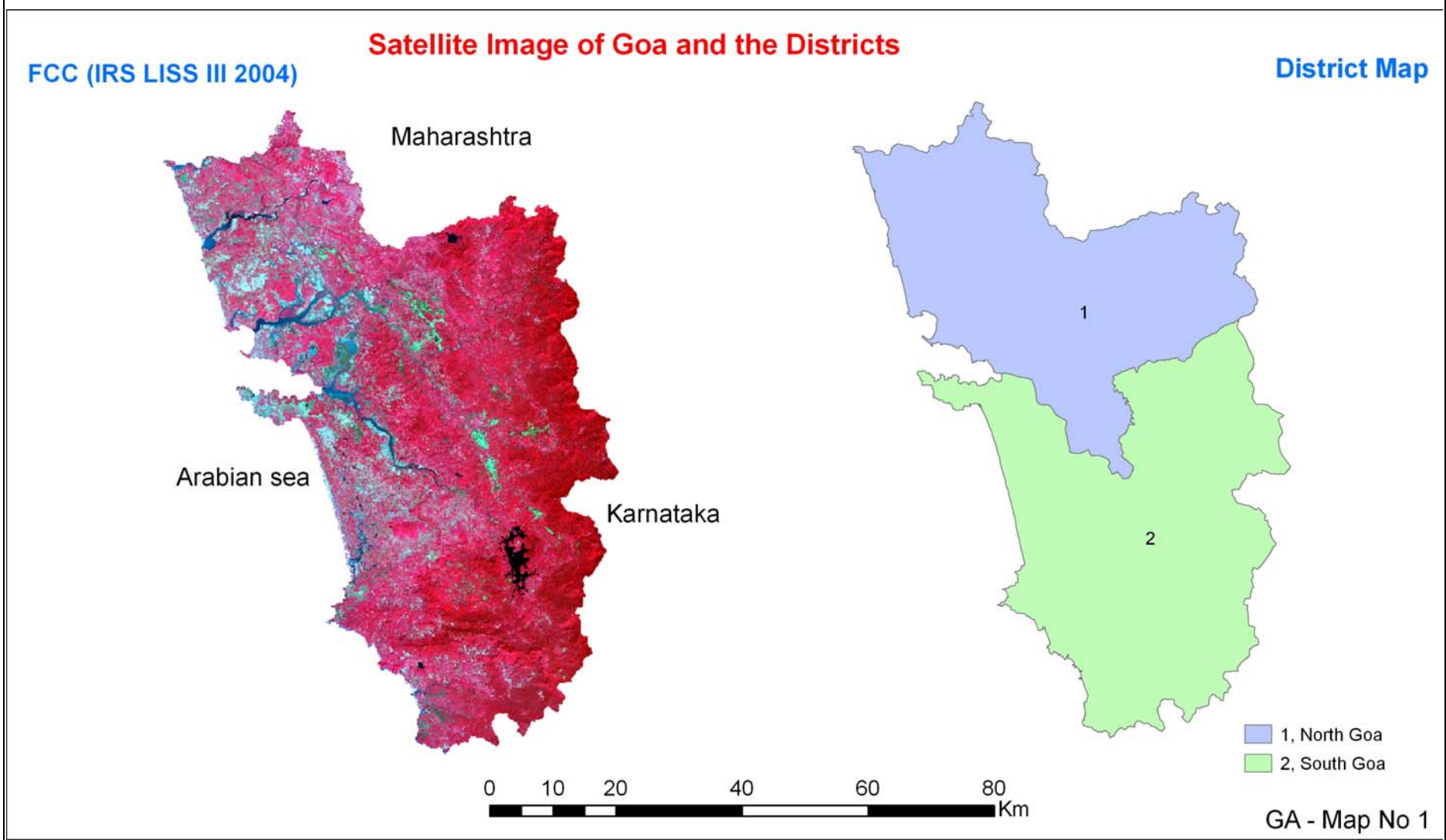
GOA

INTRODUCTION

Location and Administrative Setup: Goa State is located along the Central West coast of India lying in between latitudes 15^0 48' 00"N and 14^0 43' 54"N and longitudes 74^0 20' 13"E to 73^0 40' 33"E. The geographical area of the state is 370.200 Th ha (3702 sq. km). The altitude ranges from sea level to more than 600 m above mean sea level in the Western Ghats. The state comprises of two districts (Map 1) 360 revenue villages, 189 village panchayats and 11 development blocks. State is bounded by Maharashtra in North and East, Karnatka in South and East and western side is coast of Arabian sea. There are There are 14 municipal towns and 30 census towns. Panaji is the state capital.

As per 2001 Census the population of the State is 13.43 lakhs and the population density is 363, which is one of the highest of all the states in the country. The per capita income of Goa is the highest in the country. After a period of high population growth, the previous decade (1991-2001) witnessed a decadal growth rate of 14.89%. However, there is a decline in the sex ratio from 967 in 1991 to 960 in 2001. The literacy of Goa is 82.32% which is the second highest in the country. The percentage of cultivators has declined from 16.6% to 9.7% between 1991 and 2001. There is corresponding decline in agriculture labour from 10.9% to 6.9% during same period



Climate: The climate of Goa may be described as humid tropical to warm-humid tropical, subject to vast seasonal changes. Tropical heat, heavy and frequent rain and fierce cyclones are prevalent during summer and rainy seasons and the winter season presents warm, bright sun-shine accompanied by occasional cool breeze. Heavy rainfall from the South West monsoon is experienced from June to October. Almost 90% of the rainfall occurs in the months of June to August. The average monsoon rainfall is about 3000 mm while the maximum monsoon rainfall is about 5350 mm and the minimum monsoon rainfall is about 2128mm. A maximum annual rainfall upto 7000 mm has been observed in the eastern hilly region. The temperature varies from 9^0C to 42^0C, while the mean minimum and maximum remains between 20^0C to 35^0C.

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	125.473
Not Available for Cultivation	
A-Land put to Non Agriculture Uses	37.137
B-Barren and Uncultivable Land	-
Other Uncultivable Land Excluding Fallow Land	
A-Permanent Pastures & Grazing Land	1.305
B-Land under Misc. Tree Crops & Groves	0.580
C-Cultivable Wastelands	55.158
Fallow Land	
A-Current Fallow	-
B-Old Fallow	-
Cropped Area	
A-Net Area Sown	141.460
B-Area Sown More Then Once	27.174
Gross Cropped Area	168.634
Cropping Intensity (%)	119.10

(Source: www.indiastat.com)

Satellite Data: IRS 1D LISS III data of two different seasons namely, pre monsoon (April-May, 2003) and post monsoon (November-December, 2002) were used for delineation of waterlogged and salt affected areas of various commands of Goa.

WATER RESOURCES AND COMMAND AREAS

Water Resources: Goa region is drained by nine independent rivers flowing generally from East (Western Ghats) to West (the Arabian Sea). An exception is the Sal river in south Goa which follows a north-east to south-west course due to the west coast fault. Terekhol, Mandovi, Zuari, Chapora, Sal, Talpona, Saleri, Canacona and Galgibagh are the major rivers of Goa. These main nine rivers and their 42 tributaries play a significant role in the lives of the people of the State. Of the nine rivers, the Mandovi and Zuari alone together drain 2553 sq km, which is about 70% of the total geographical area. The rivers in Goa are a major source of potable water. The surface water system is intimately linked up with the development since they provide irrigation facilities for agriculture, produce biotic and mineral resources, help in the barge-based transport of ore from the mining areas to the port and ferry people & goods to different parts of the state. Goa rivers are unique in that they are both tidal and rainfed. All the rivers are subjected to tidal influence to a great distance inwards from their mouth. In some cases, the ebb flows of the tides reach 40 km inland. The salinity factor in the river varies sharply between the monsoon and non-monsoon period and so does the quality of water in wells all along the banks, which tends to get increasingly saline as the summer months advance.

Command Areas: There are 5 irrigation commands in Goa. Number of major and medium irrigation commands are 2 and 3, respectively (Map 2).

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

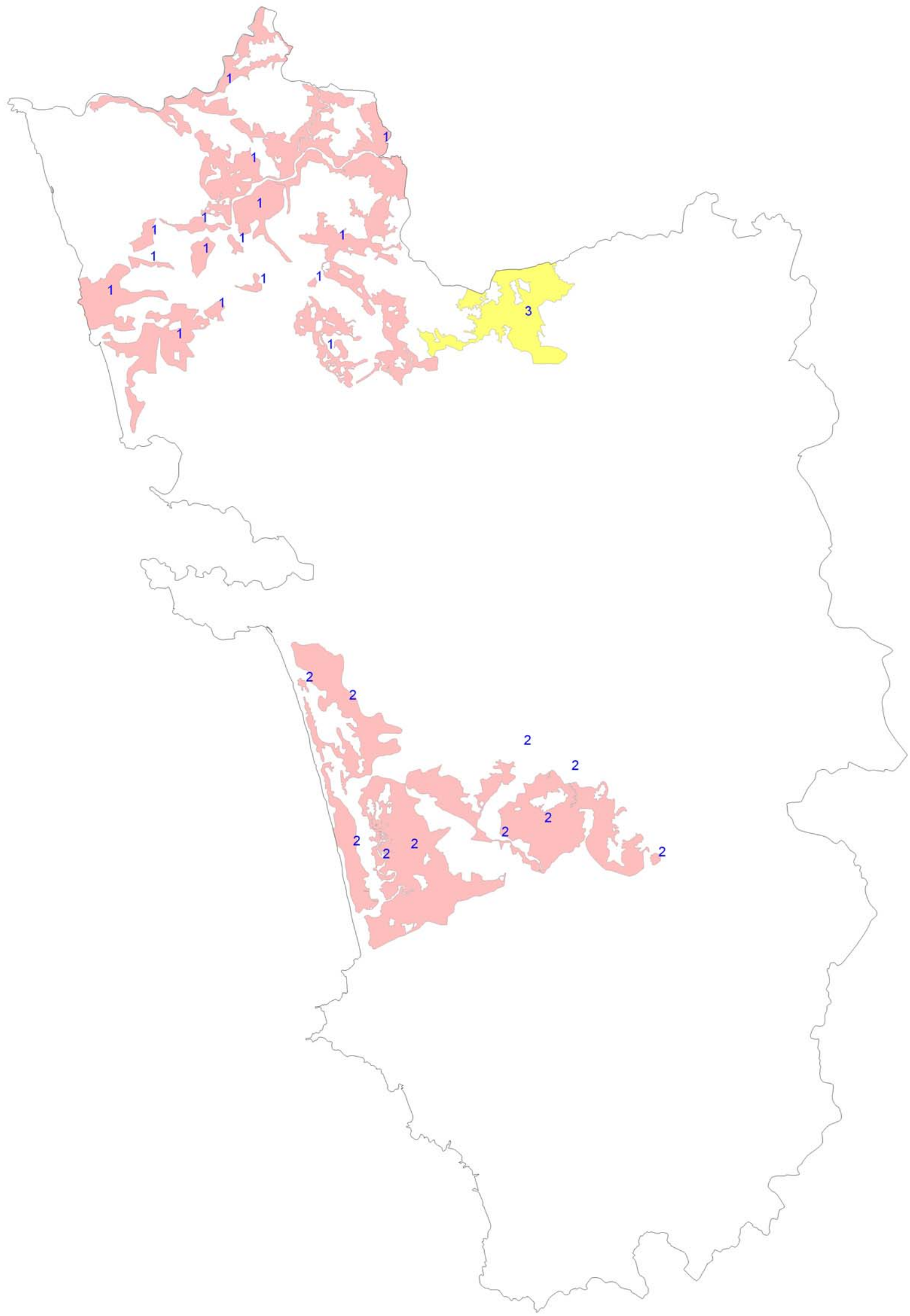
State has no area under waterlogging and salinity as per analysis of data of 2003–'04. Total 21 soil samples were collected to check the salinity / alkalinity in the command.

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)
1	Tillari	Major	0.000	0.000
2	Salauli	Major	0.000	0.000
4	Anjunem*	Medium	0.000	0.000
3	Mandovi	Medium	0.000	0.000
5	Zuari river basin project*	Medium	0.000	0.000
	TOTAL		**0.000**	**0.000**

*Command boundary not available

Distribution of Major and Medium Irrigation Commands in Goa



1 Major comamnd areas with code

3 Medium comamnd areas with code

0 3 6 12 18 24 Kms

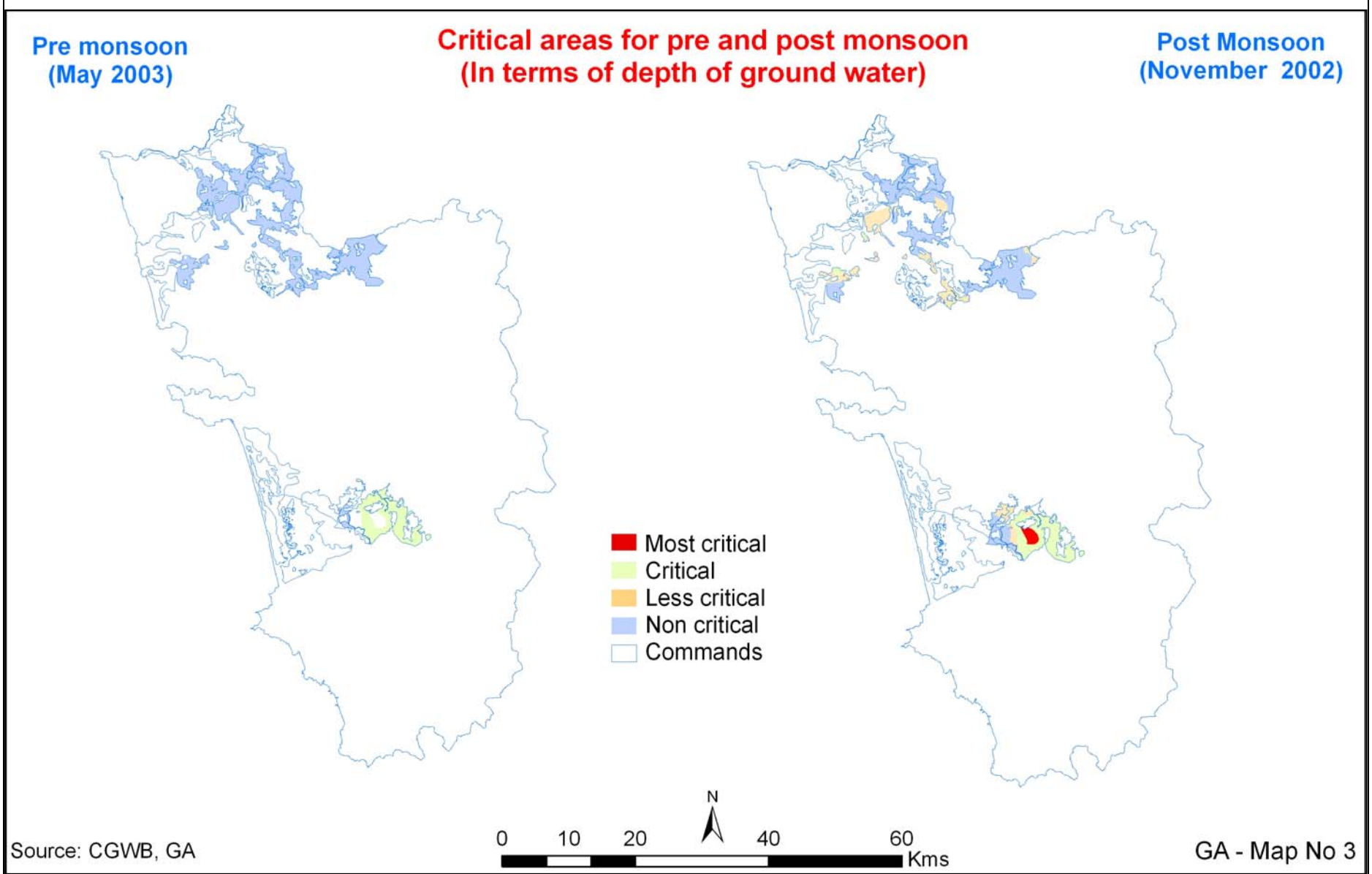
GA - Map No 2

Source: Irrigation Department, Goa

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 3 show the critical area of depth of ground water for pre (May, 2003) and post (November, 2002) monsoon. Ground water data was available for part of the study area.

Table 3: Critical Area of Depth of Ground Water for Pre (May, 2003) and Post (November, 2002) 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 (May, 2003)	0.428	1.12	3.922	10.29	0.986	2.59	32.784	86.00
Post Monsoon (November, 2002)	0.425	1.11	3.592	9.42	4.379	11.48	29.724	77.99



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