

CHAPTER - II

WATER RESOURCES

Water resources :

Any region has two type of water resources (i) Surface run-off and (ii) Fresh groundwater. The magnitude of earlier depends on the amount and intensity of rainfall and its variability. Whereas later depends on how far the surface runoff is conserved to recharge the groundwater. The success of irrigation and power project and cropping pattern depend on the degree of dependability of such water resources.

2.1 Surface water resources :

Based on the natural drainage, Maharashtra can be divided into the basins like Krishna, Bhima, Godavari, Wainganga, Tapi and Konkan rivers.

1) Krishna river basin :

Krishna rises on the southern slopes of the Mahabaleshwar hill. In the upper reaches the Koyana is right bank tributary. The Varana, the Panchaganga and the Dudhaganga are the other right bank tributaries of Krishna. The Yerala is the only significant left bank tributary in the state. The basin covers an area of 54.03 lakh acres of area comprising 769 TMC feet of water resources. It is eastimated that about 25.5% of the arable area can be irrigated in Krishna Basin.

ii) The Bhima basin :

Bhima rises near Bhimashankar in Poona district. It has a flow south-eastwards for about 500 kms. It is a larger tributary of Krishna. The Ghod and the Sina are its left bank tributaries, while the Mula-Mutha, the Nira and Man are its major right bank tributaries. It covers 119.33 lakh of acres area having 310 TMC feet water resources. It could irrigate about 19.1% of the arable area in the basin.

iii) The Godavari basin :

River Godavari rises in Tryambak hills near Nasik and flow east and south eastward for a distance of about 800 kms. in the state. The basin covers a total area of 172.35 lakh acres. The Darana, the Pravara, the Sindhaphana and the Manjara are some of the important right bank tributaries. Whereas the Sewand, the Purna-Dudhana, the Pranhita and the Indravati are the left bank tributaries. The total water resources of the Godavari basin are about 403 TMC feet which would irrigate about 16% of the cultivated area in the basin.

iv) The Wainganga basin :

The Wainganga rises in the Maikal ranges outside the state and flow southwards to join the Wardha-Penganga at Seoni. This sub basin of Godavari covers an area of 208.61 lakh acres.

It comprises 720 TMC feet of water resources. It is estimated that about 26.1% of the cultivated area can be brought under irrigation by utilising the available water resources.

v) The Tapi basin :

The Tapi rises in the northern slopes of the Gawilgad hills. The Tapi flows in a fairly deep valley with highly eroded steep banks. The Purna is the main tributary of the Tapi whereas Girana, the Panjhara and the Borary are the other tributaries. The total size of the Tapi basin is 133 lakh acres having about 229 TMC of water resources. But the fact is that being badly dissected ravine area it is less useful. However, about 15.6% of the arable land can be brought under irrigation in this basin.

vi) The Konkan rivers :

The Konkan rivers have dissected the low land. They all rise in the steep western scarp of the Ghats and fall in to Arabian sea. The major rivers to the north are Vaitarna and Ulhas. Whereas the Patalganga, the Amba, the Kundalika, the Terekhol are the main central and southern rivers of the Konkan. They all cover an area of about 77 lakh acres comprising about 1500 TMC feet water resources. Though these rivers over flow during the monsoon season. The flow reduce to

trickle in the summer. Moreover the steep slope and rugged topography are some of the constraints in the utilisation of surface water resources of the rivers.

2.2 Groundwater resources :

The assessment of groundwater indicate that the State on an average receives an annual recharge of groundwater to the extent of 20,967 million cubic meters. However there seems to be high regional variations in it throughout the state (Fig.2.1A). The western and eastern parts of the state have recorded higher recharge (above 9 million cubic meter). It can be well attributed to the hilly terrian, thick forest cover and heavy rainfall in those parts. On the contrary the central most part of the state is very poor in groundwater recharge. It is because of very low rainfall, less provision for storage of rainwater like bunded area, low irrigated area and more open lands. Adjacent to the east and west of this zone lies a region of moderate recharge. It is partly due to higher proportion of irrigated area and partly due to better rainfall conditions.

Groundwater utilisation :

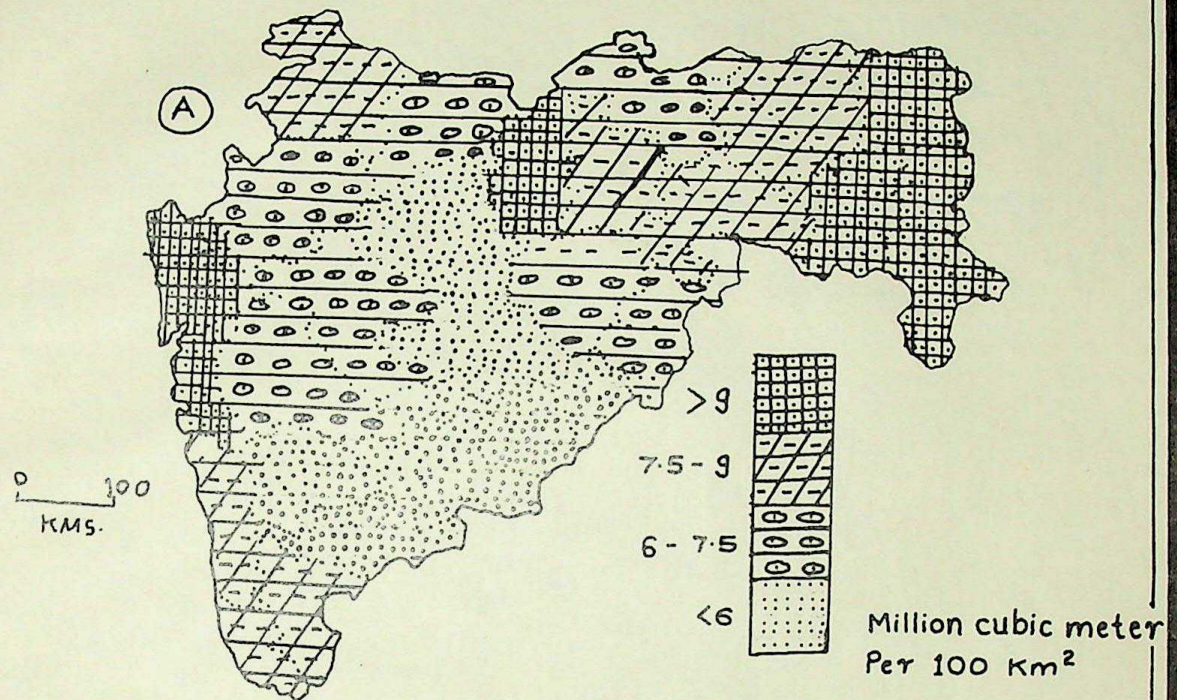
As against the recharge of groundwater the present extraction is found to be only 6295 million cubic meters, i.e. about 30 percent. The disparities regarding the utilisation are

also observed largely throughout the state (Fig.2.1B). The interesting point to note is that the utilization of ground water is high where recharge is poor and vice-versa. The western part of the Deccan plateau i.e. from Jalgaon district in the north to Sangli, district in the south, is the zone of high extraction (above 2.5 million cubic meter per 100 km²). It is because of higher need of irrigation and also the fact that it is the only reliable source of water available in this zone. The zone of moderate extraction comprises Buldhana, Parabhani and Beer districts to the east and Thane, Satara and Kolhapur districts to the west, of above zone. Whereas poor utilization of groundwater is observed (below 0.5) to the eastern and western margins of the state. Less need of irrigation, unsuitable terrain for digging the wells, high fluctuation of water table are responsible for poor utilization.

The spatial distribution of wells (a major means of extraction) also reveals the regional imbalances in the extraction of groundwater. In general, the physical setting of wells is governed by the topography and also by the behaviour of the groundwater (Pawar and Shinde, 1979). Relatively the zone of larger concentration of wells (over 50 per 1000 hectare of cultivated area) is observed to western deccan plateau (Fig.2.2A). It is followed by the adjacent districts of the above

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ANNUAL RECHARGE OF GROUND WATER



ANNUAL GROUND WATER WITHDRAWAL

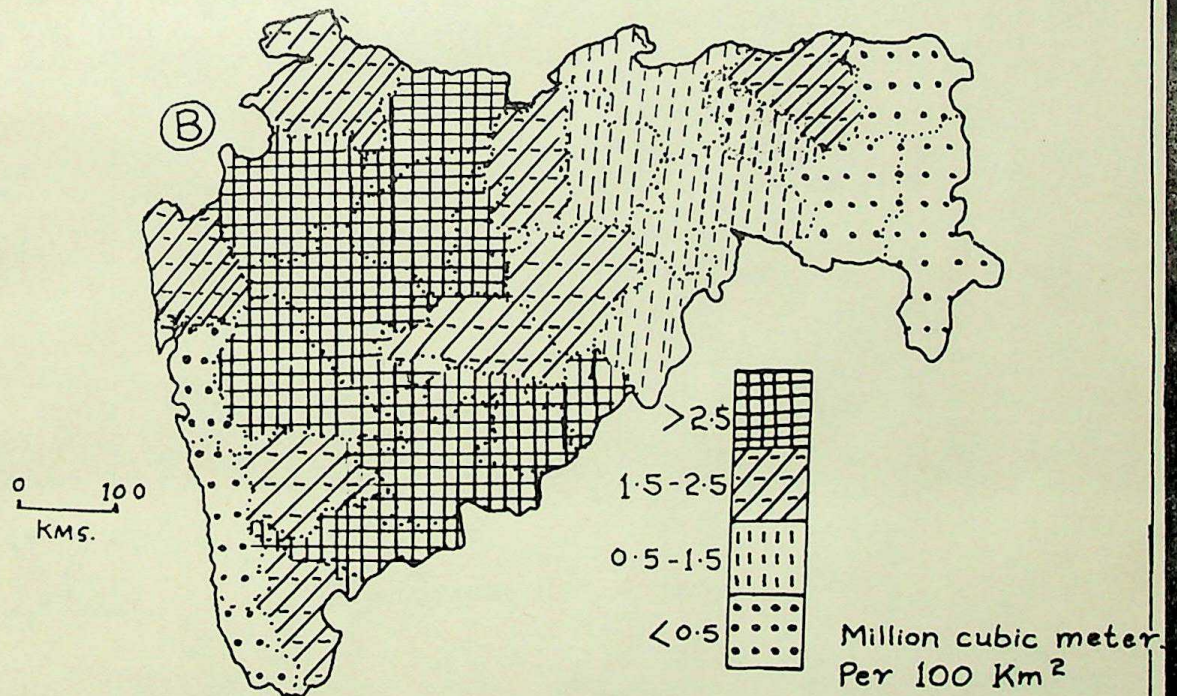
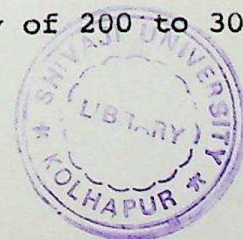


FIG. 2.1

zone. The occurrence of high and medium density of wells can be explained by the fact that wells happen to be the only source of irrigation in those areas. The low density of wells (below 30) is mainly observed in the hilly tracts of Konkan districts to the west and Chandrapur and Gadachiroli to the east. The districts of Yavatmal, Akola, Parbhani and Nanded also have low density as the proportion of cultivated area in relation to the absolute number of wells is more.

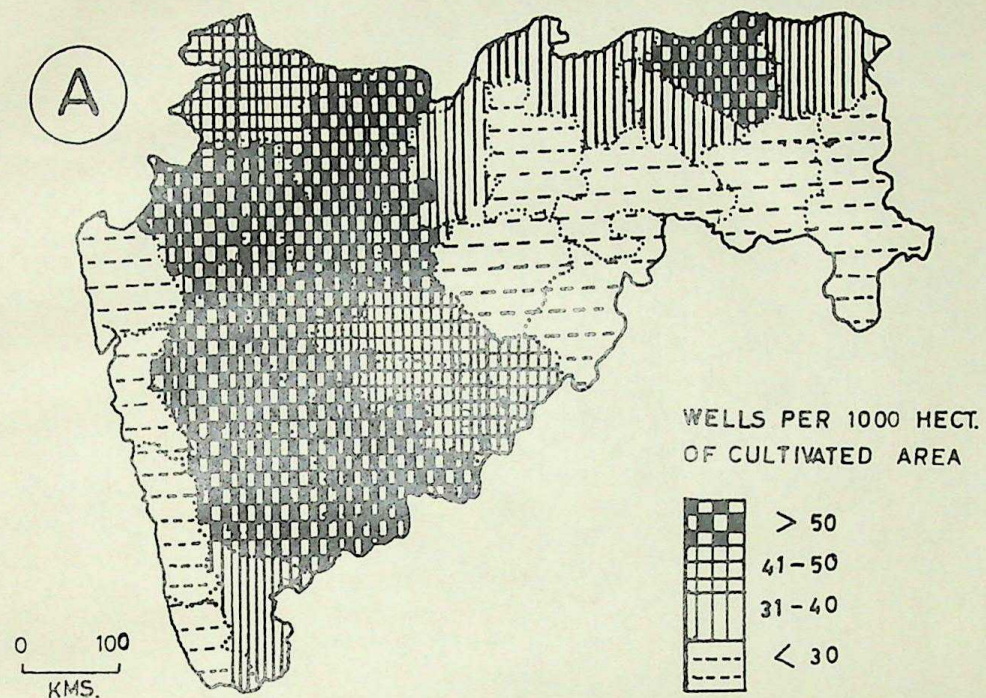
Scope for development :

As against the total recharge, the withdrawal is only about 30 percent, this indicates the large scope for groundwater development in the state. On an average an irrigation well tapping a hard rock formation like the Deccantrap lava flows yields about 12.2 thousand cubic meter of water per annum. This is considered to be adequate for irrigating about 2.5 hectare of seasonal food crops (Karkare and Rakshit, 1979). On this base there seems to be sufficient scope for constructing about 5 lakh additional irrigation wells. These would help to bring 12.5 lakh hectare of additional area under irrigation. However, spatial distribution of such wells reveals that very high potential (over 300 wells per 100 km²) is confined to the eastern and western hilly tracts of the state (Fig.2.2B). It is due to higher recharge rate of ground water compared to its withdrawal. The feasibility of 200 to 300

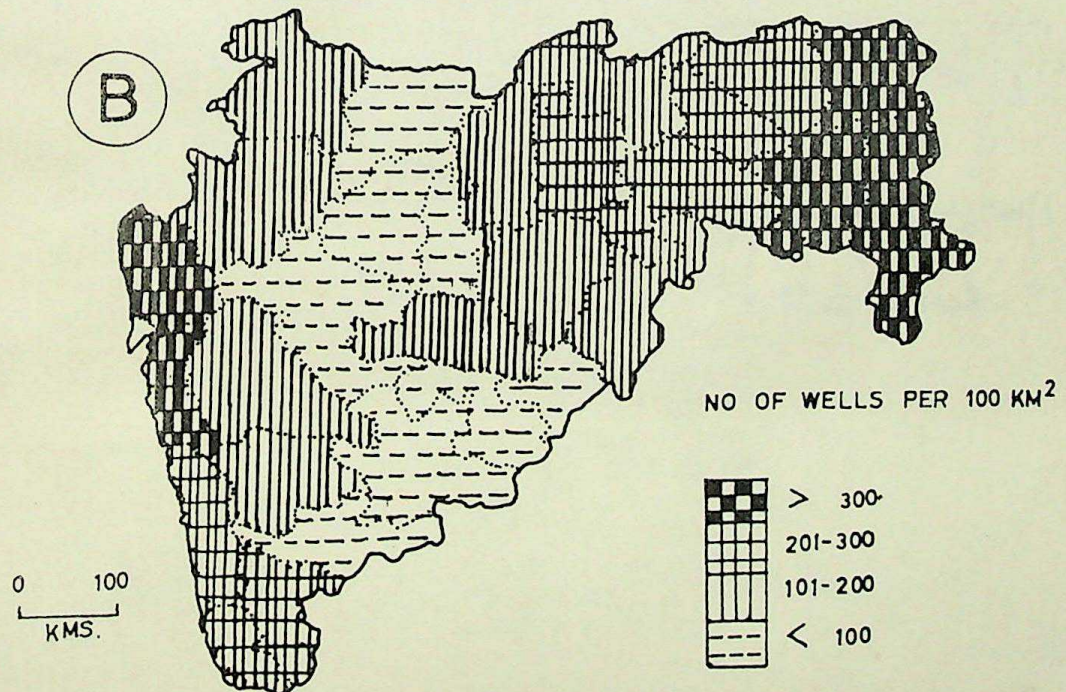


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DENSITY OF WELLS



ADDITIONAL WELLS FEASIBLE



wells is noted to the adjacent districts of the above zone. Whereas poor potential (below 100) are observed in the central deccan trap districts. In these districts some of the water sheds are over - developed where digging of wells any more may prove uneconomic and perhaps would disturb the eco-system. In such areas constructions of nala bunding, contour bunding and percolation tanks etc. is necessary to increase the groundwater recharge. Besides the dug wells, there is scope for digging tubewell in soft rock areas of Tapi-Purna alluvial basins.