Chapter - 5

SUMMARY AND CONCLUSIONS
As mentioned earlier that the groundwater resources hold the key to the natural resources hence the groundwater studies have dominated in the present piece of work. The land use/land cover studies are also been apprehended to make this study holistic.

The results obtained from the present studies can be summarized as follows:

1. Plot of logarithm of cumulative stream length vs stream orders gives straight line, which indicates that the ratio between cumulative stream length and stream orders is constant. Thus, geometrical similarity is preserved.

2. Bifurcation ratio ranges between 2.30 and 5.0 with the average value of 3.35. This implies that the drainage pattern in almost all the watersheds has not been distorted because of structural disturbances.

3. High form factor values for watersheds WS40, WS41, WS43, WS49, WS52 and WS53 shows that their basins are circular having high peak flows for shorter duration. Whereas the form factor values of WS44, WS46, WS47, WS48 and WS51 confirms their elongated basins with flatter peak flows for shorter duration. The flood flows of elongated basins are easier to manage than those of circular basins.

4. Texture ratio values vary from 0.152 to 0.631 with an average value of 0.416 indicating medium runoff.

5. Drainage density values vary from 0.57 to 0.71 with mean value 0.63, which is very low. Low value of drainage density indicates that the area is mostly covered by resistant permeable rocks with a dense vegetation cover.

6. Low values of drainage density, infiltration ratio and stream frequency for WS40, WS41, WS42, WS47, WS49, WS50 and WS51 indicate that groundwater level in these watersheds is high and shows high infiltration, low runoff confirming the presence of more weathered and fractured basaltic rocks. Whereas the values of Dd, IF and Fs are higher for WS39, WS43, WS44, WS45, WS46, WS48, WS52
and WS53 indicating low groundwater levels having low infiltration and high runoff which confirms the presence of less weathered basalts and more impermeable materials in these watersheds.

7. The analysis of shape parameters also shows that watersheds WS44, WS48 and WS51 are more erosion intensive and can be considered for construction of check dams.

8. Chemical analysis of groundwater shows alkaline nature of water in entire district except Karjat C.T. where the water is slightly acidic.

9. Strong correlation has been observed between total hardness, electrical conductivity, Na, Mg, Ca and Cl ion concentrations.

10. Bicarbonate is the dominant ion with the concentration ranging between 24 to 396 mg/lt.

11. Although at some stations the values of nitrate (Owle, Panvel, Taloje Panchnad C.T. and Mangaon) and fluoride (Birwadi and Murud) far exceeds the permissible limit yet groundwater of the district is suitable for drinking and domestic uses as most of the other parameters lie within the permissible limits.

12. High concentration of (Na + K) and ratio of 0.57 between (Na + K)/ Tz⁺ indicates that silicate weathering, contribution from seawater and saline/alkaline soils are important sources of major cations to the groundwater.

13. From the US salinity diagram it is clear that most of the samples fall in low to medium salinity and low alkalinity category. This implies that they can be used for irrigation on almost all soils. Few samples show low to medium alkalinity and high salinity and can be used only where plentiful water is available for irrigation.

14. Wilcox diagram shows that 57 samples fall in ‘Excellent to Good’ category while remaining 6 samples are in ‘Permissible to Doubtful’ category for irrigation.
15. Based on Residual Sodium Carbonate (RSC) values it can be inferred that the groundwater in Poyanje, Vashi, Borli Panchtan and Borli is unsuitable for irrigation.

16. Permeability Index (PI) values show that 45 samples are suitable for most of the crops under most conditions and 15 samples can be used satisfactorily for most of the crops if care is taken to prevent the accumulation of soluble salts and sodium in the soil. 7 samples were found to be unsatisfactory for crop production.

17. Depth to water table data shows good correlation with rainfall data. Groundwater level was found to be higher in the year 1991 when rainfall was above normal as compared to that of years 1995 and 2000.

18. Higher lineament density (> 2 km per sq km) in northern part of the district shows high groundwater potential. Lineament intersection points are also mainly clustered in northern part of the district showing better groundwater prospects there. While southern part of the district has lower lineament density confirming limited or low groundwater potential.

19. About 35 % of the district area is constituted by flood plains, river terraces and coastal low lands having gentle slope. These features account for good groundwater prospects. Whereas 46 % of district area has moderately steep slope with dense vegetation cover accounting for moderate groundwater prospects.

20. Area under Built up land in the years 1997-98 is found to be 33.25 % higher than that in the years 1988-89. This is an indicative of faster urbanization in these years.

21. The area under kharif crops in the years 1997-98 was found to be 0.60 % less as compared to that in 1988-89.

22. The rabi cultivation has substantially increased (300 %) as compared to that in the years 1988-89. This may be attributed to development of better irrigation facilities in the district.
23. More fallow lands are found in interior talukas such as Mangaon, Poladpur, Roha, Mhasla, Mahad have more than 60% of their agricultural land as fallow land.

24. The area has a great potential for agriculture provided the water resources are optimally used and irrigation facility is developed.

Finally, It can be concluded that:-

Groundwater management is the key to natural resource management. Hence by optimum use of the vast water resources available in the district the agriculture and inland farming of the district can be developed. Improvement of irrigation facility will facilitate much of its agricultural lands to bring under rabi crops. The area in spite of being closer to Mumbai and Pune is undeveloped in terms of levels of urbanization and industrialization. Hence the management of natural resources such as groundwater, agriculture and forests particularly the mangroves is of utmost importance in the district in order to achieve a better level of urbanization and industrialization.

It was also found that Indian Remote Sensing (IRS) data is highly suitable for natural resources studies and Geographical Information System (GIS) is a very powerful tool for handling and manipulating the spatial database for natural resource management studies.