CHAPTER 9

SUMMARY AND CONCLUSIONS

9.1 SUMMARY

This chapter embodies the summary of the observations and conclusions derived from the field and laboratory investigations carried out in Madras. The present work is an integrated attempt to synthesis the results of geomorphological, hydrogeological, hydrogeochemical and hydrogeophysical studies.

The analysis of subsurface lithologic units revealed that the thickness of sediments increases towards the coastline forming a very good groundwater reservoir.

It is characterised by the presence of semiconfined to unconfined aquifers and the aquifer horizon is continuous. The hydraulic gradient is flat to very gentle in the northern part of the area and it is found to be reversed in the south.

The aquifer thickness is more nearer to the coast. The Coastal area has recharge zone all along the margin. The depth to water level below ground level varies from 1.2 m to 4.8 m during post monsoon and 3.1 m to 7.92 m during pre monsoon period.
The areas of recharge and discharge have been delineated by preparing a grid deviation water table map. This area has a recharge zone all along the western margin.

To assess the qualitative characteristics of groundwater in this coastal zone, water samples have been collected from 44 locations. From the TDS map it can be seen that potable groundwater is found in Central Madras and North Madras. In south Madras, Besant Nagar and Thiruvanmiyur have potable water. The other areas are found to be slightly saline.

The most widely seen water type in this area are III which occupies a major portion of the study area followed by type IV and type II.

The quality of groundwater has also been assessed based on the chloride ions. It has been seen found that the area is dominated by moderate salinity.

Groundwater in this area is mostly characterised by permanent hardness.

The results of factor analysis have shown that factor I is represented by a high concentration of Ca, Mg, Na+K, HCO₃, Cl and SO₄ and factor II is represented by NO₃ and factor III by CO₃.

The results of the geophysical studies as shown by the isoapparent resistivity maps show that the groundwater conditions at 10 m and 20 m depths represent the saturated aquifer environment and at 10 m depth the aquifer media could be classified into freshwater and slightly saline zones. It is also found that the aquifer zones adjacent to Cooum and Adayar are not good and may show problems of contamination by natural or man-made causes.
9.2 CONCLUSIONS

1. Madras city forms a part of Tamil Nadu coast characterised by the presence of semi-confined to unconfined aquifers.
2. The thickness of sediments increases towards the coast line forming a very good groundwater reservoir.
3. The landuse patterns have obstructed the groundwater recharge from precipitation.
4. The available surface water resources are not adequate enough to meet the demand.
5. The available groundwater resources are to be exploited carefully, since over exploitation in any part of the area may invite seawater encroachment.
6. The quality of groundwater is affected due to the adjacent saline water from the sea or due to the municipal sewage and domestic wastes. Urban pollution has a major impact over the groundwater quality.
7. Sustainable water resource development and management is suggested for improving the groundwater in storage and also for meeting the future demands of groundwater.
8. Aquifer simulations with different stress conditions revealed the zones which will be affected more.
9. Such integrated studies can help in solving the problems of other urban coastal environments having similar hydrogeological setup.
10. The impact of urban growth would be very severe over the groundwater conditions of any coastal area.