CHAPTER VII
CONCLUSION
7.1 Conclusions

Spatial integration of remote sensing and GIS is a formidable tool in analyzing resources, land and water, of an area and has a significant role in environmental applications. In the present study, integrated approach using remote sensing and GIS was carried out in upper Noyil basin, Coimbatore district, Tamilnadu, south India to understand the hydrogeological and groundwater condition of the basin. GIS integrated approach using thematic information from remote sensing satellite data and other field collateral data has helped to derive following conclusions of the study area, upper Noyyil basin.

Remote sensing data helped to delineate various lithological and landform units of the study area. It has also helped to prepare landuse map of the study area, with limited field check, in conjunction with the information obtained through digital image analysis of the study area. Thematic maps that were prepared from remote sensing data and other baseline references suggested a geological and geomorphic predominance in the study area.

Image analysis of the study area using different image processing techniques such as edge enhancement, textural analysis, PCA, NDVI and clustering has contributed enormously to the study. Various enhancement techniques in radiometric, spatial and spectral domain highlighted geological, structural, geomorphological and landuse/land cover features of the study area. They helped to appreciate the intrinsic differences among various units within a thematic layer.
Clustering of pixels based on color index was used as a simple reconnaissance analysis of the study area to identify various terrain features and provided significant information about the terrain that helped in understanding hydrogeological condition and groundwater level fluctuation of the study area while carrying out GIS analysis.

Various groundwater probable (GWP) zones such as very high, high, moderate and poor were demarcated by integrating remote sensing and GIS techniques. GWP zones were closely associated with the lithological parameter and showed significant influence of landforms. Very high probable zone was mostly associated with buried pediments (deep) whereas poor probable zone was associated with outcrops and structural hill at the western part.

The areal percentage derived from the spatial extent of very high probable zone, high, moderate and poor probable zones showed 12.4%, 39.55%, 34.92% and 13.99% respectively. The spatial trend thus derived from the integration clearly amplified the significance of landforms in controlling the groundwater occurrence. The delineated GWP zones corroborated well with field data and reiterated further by spatial analysis of landuse pattern.

The seasonal groundwater level fluctuations indicated an increase in areal extent in low fluctuation zone during the northeast monsoon when compared with summer season in the study area. Moderate zone seemed to be almost static implying a geological and geomorphic control over the groundwater oscillations. Similarly, high and very high oscillating zones were mostly confined at the northeastern and northwestern parts, again implying a geological control in the study area.
Spatial pattern of low degree fluctuation at the western part of the study area implied geomorphic control on the groundwater oscillation, since bajada, sand deposits, river alluvium and buried pediment (deep) were the major landforms in that area.

The analysis has significantly brought out the relation between the spatial patterns of various landuse categories and GIS derived groundwater probable (GWP) zones. The result thus derived through GIS corroborated well by relating them with the landuse and land cover pattern.

The study has brought out the greater affinity of groundwater with the lithological units of the study area. The study has also brought the significance of various types of landforms in identifying and delineating GWP zones through integrated approach using remote sensing and GIS.

Groundwater level fluctuation (GWF) zones showed remarkable similarity with the existing landuse pattern showing intense agricultural activities in the low fluctuation zones whereas it was less in the case of very high fluctuating zones.

Comparative analysis using the area of various GWF zones and landuse categories brought the significance of intrinsic relationship between the groundwater condition and landuse condition of the study area.

Thus, this study concludes that the analysis using GIS techniques was very meaningful in understanding the inherent and intrinsic relationship among various parameters such as lithology, landform, soil, rainfall, groundwater table and landuse units. Remote sensing and GIS have a pivotal role in understanding the relation between groundwater environment and terrain parameters including land use of an area. Such an understanding
may help in effective management of groundwater resources and could form basis to address local problem.