CHAPTER 8

SUMMARY
SUMMARY

Delhi region has two important geomorphological features, the famous Delhi ridge and the alluvium of Yamuna. The Delhi ridge which covers the area of present study is predominantly made up of quartzites. These quartzites are intruded by pegmatites sporadically. These pegmatites had undergone alteration along with surrounding quartzites to give rise deposits of china clay, silica sand and ferruginous sand (Badarpur sand). Spheroidal weathering of quartzites is abundant and the quartzites on their surfaces form weathering rinds of varying thickness. Besides the depressions on the Delhi ridge have accumulated the aeolian sediments of probable aeolian origin.

The present study on the quartzites, altered pegmatites and quartzites and the sediments provide a holistic approach to constrain upon the geological processes leading to geomorphological and geological transformation of Delhi region. The study involved textural, mineralogical and geochemical investigations on each of the geological units (lithologic and quaternary sediments). The involvement of surfacial and sub-surfacial agents for such a weathering and depositional process indicates a complex geological system. Some of the crucial observations are well substantiated with the geochemical data resulting in some interesting hypotheses as:

1. The quartzites on Delhi ridge are mineralogically and geochemically supermature sandstones, formed on a stable cratonic margin undergoing prolonged weathering and sedimentary recycling.
systematics in the quartzites suggest that the lower zones can be the temporary sink for the clays and REE rich phases. The similar weathering processes in the protoliths leading to the formation of quartz rich zone at the surface and their erosion could result in the formation of supermature quartzites.

(3) The pegmatites and surrounding quartzites were hydrothermally altered to form loose ferruginous sands, china clay (kaolinite) and silica sand. The hydrothermal activity could likely be related to Himalayan orogeny.

(4) Rare earth elements have been found to be mobile during weathering and hydrothermal alteration. REE fractionation is not significant during these processes, because of sulphate dominated solutions responsible for weathering and alteration. Thus REE fractionation during rock alteration appears depend on the nature of the solution and mineralogical changes.

(5) The sediments deposited on the ridge are loessic, having chemical composition, texture and mineralogy similar to other loesses of the world, and compositionally similar to the upper continental crust. The source of these sediments may be the glaciofluvial deposits derived from the Himalayas, perhaps during periods of past glaciation. The dust storms originating in the Thar desert is an important process for the material transfer except the alluvial processes in this region. The dust transport and their deposition by westerly to south-westerly winds are very important for the nutrient supply (base cations) and acid rain neutralisation in this region.

It is suggested that the surface geology of the Delhi region has been affected by Himalayan orogeny in many ways. Water and fertile sediments (soils) of the region have been brought from the Himalayas by the surface geological processes perhaps since
Summary

Quaternary times. Subsurface processes probably caused or is still causing high temperature fluid flow from the thickened crust in the Himalayas to this region resulting in the physicochemical alteration of quartzite and pegmatite and the production of useful materials such as sand and china clay. It is well known that the seismicity of the Delhi region is due to Himalayan collision. This is clear from the simplified geoenvironmental model shown in Figure 8.1.
Figure 8.1: Simplified geo-environmental map of Delhi region showing dust transport from the Thar desert and their deposition on Delhi ridge and transport of hydrothermal fluid from Himalayas along the ridge. The elevated geothermal condition could be responsible for the hot water springs in Sohna area and alteration of quartzites and pegmatites of this region.