

## **Geo-information as a decision support system for urban planning and exploration of minerals**

Muhammad Shafique, Muhammad Sayab, M. Asif Khan and M. Tahir Shah

*National Center of Excellence in Geology, University of Peshawar*

Email: [shafique08@yahoo.com](mailto:shafique08@yahoo.com)

Geo-information encompassing the emerging technologies of air-borne and space-borne Remote Sensing (RS) and Geographic Information System (GIS) are frequently and efficiently used for assisting in exploration and sustainable utilization of natural resources. GIS and Remote Sensing are efficient tools to acquire spatial and temporal information of an object or phenomenon from a distance at different scales; from local to regional. Remote sensing derived satellite images and aerial photos are used as input in GIS environment to generate interactive maps and geo-database of natural resources. Effective decision making for sustainable use of natural resources often requires the information of existing resources and rate of exploitation that can be subsequently used for the future predictions and give recommendations for their sustainable utilization.

The province of Khyber Pakhtunkhwa is blessed with natural resource ranging from forests, rivers, minerals, hydrocarbons and fertile agriculture land. However, their unplanned exploitation has posed a threat to the sustainable utilization of these resources for the socio-economic development of the province. In the present study GIS and Remote Sensing are extensively used as a decision support system for the urban planning in the district Peshawar and exploring the mineral resources in the Khyber Pakhtunkhwa. The satellite images of the Peshawar district is used to map road network, landuse and drainage network of Peshawar. Moreover, the facilities like education institutions, health facilities and police stations were mapped and their necessary attributes were collected that can be used by the decision makers to evaluate the existing facilities in Peshawar and accordingly plan the new developments projects.

The initial step in mineral exploration is locating the sites with potential of mineral deposits of economic importance. The geochemical analyses of stream sediments are used to demarcate watershed with potential metal concentrations. In the present study the remote sensing based ASTER DEM of the entire Khyber Pakhtunkhwa *is used for the drainage analysis to map all the drainage network and corresponding watersheds. Watersheds having spatial extent of more than 15 km<sup>2</sup> are selected as the optimal watershed for the sediment sampling. Outlets of the watershed were automatically derived as sites to collect sediment samples for the geochemical analysis to investigate the concentration of various metals, especially precious metals. The results can be used to search for the source rocks of these metals during detail studies. This study shows the effective application of GIS and Remote Sensing for natural resource management.*