Role of Satellite Remote Sensing for Forest Resource Management in Pakistan

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Importance of forest for a country like Pakistan is significant and well known. The satellite remote sensing applications in forestry offer great advantages and can lead to better monitoring, planning and management of forest resources in the country. Synoptic coverage, imaging access to inaccessible areas, concurrently temporal viewings enables to holistically understand and monitor forest environment. It also assists, in determining forested area, forest health, aforestation or deforestation activities and overall impacts.

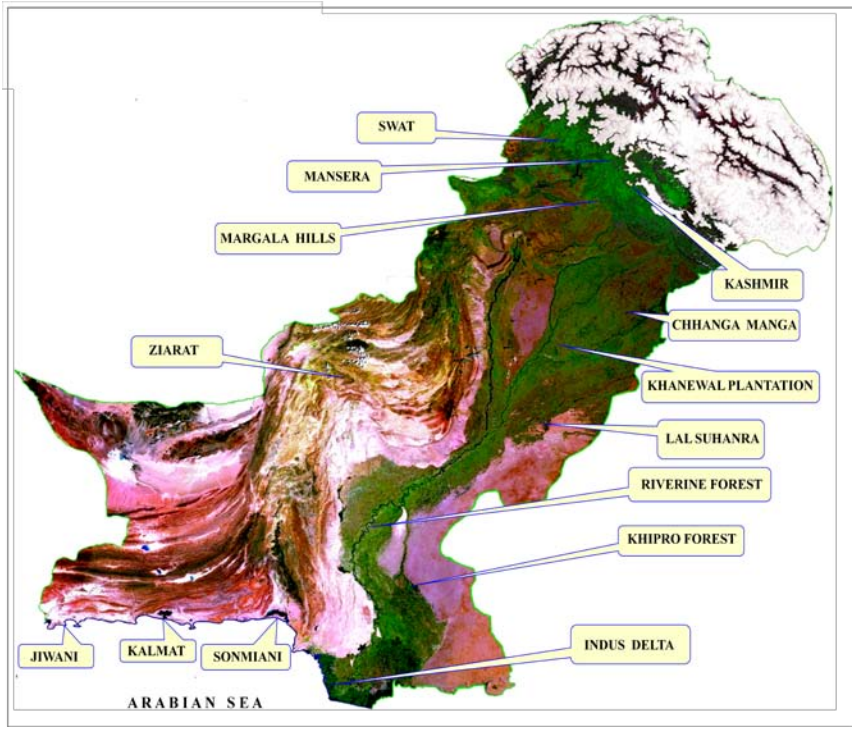

Figure 1. Forest cover distribution in Pakistan

SUPARCO under its space applications and research programme has carried out R&D and collaborative studies to assess the forest resources of Pakistan including riverine, irrigated inland plantation, hilly and mountainous and coastal mangrove forests. Some of the studies carried out by SUPARCO in this regard are briefly discussed in the successive paragraphs.

1. Coniferous forests are located along the lower ranges of the Himalayas and Hindu Kush in Khyber Pakhtunkhwa (KPK), Azad Jammu & Kashmir and Northern Areas covering the country's major watershed areas. They are rich in biodiversity, protect steep upper slopes of watersheds, supply people with lumber, fuel wood, fodder and medicinal plants.Satellite remote sensing images were acquired and analyzed to map spatial extent of forests along with other prominent land cover categories. A satellite image map of Swat valley highlighting distribution of forests is given in Figure-2.

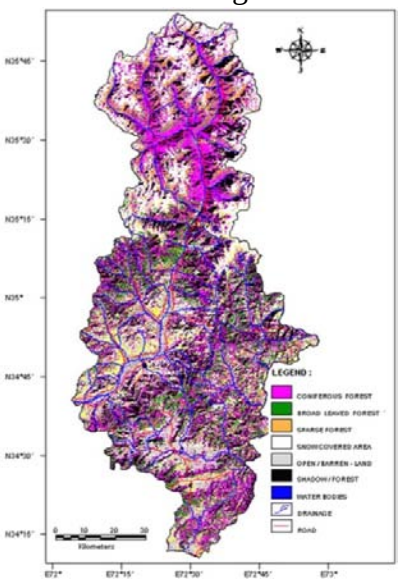

Figure 2. Landcover map of Swat

2. Irrigated forest plantations are spread over the plains of Punjab and Sindh.The canal water is used for development and growth of these plantation. A typical example is Chhanga Manga irrigated forest plantation spread over 4860 ha. Satellite image based map of theseplantation showing dense, normal and barren land with in this forest.

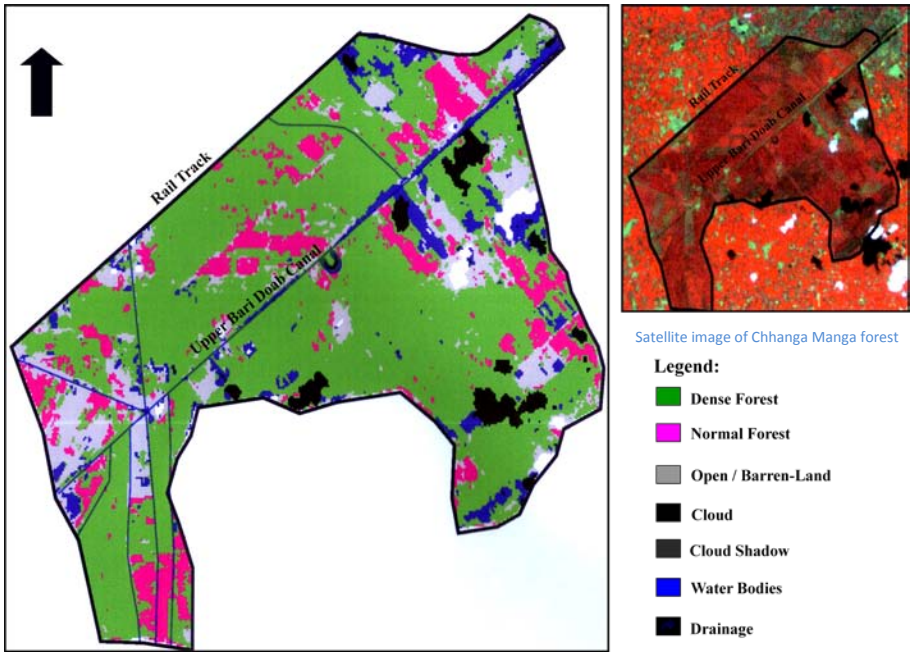

Figure 3.Changa Manga irrigated plantation

3. The riverine forests mostly grow along the River Indus in the flood plains of Sindh and Punjab. Their existence depends on annual flooding in the Indus basin. These forests are of high economic value yielding timber, fuel wood, latex and silage. These forests also form a protective line barrier between river and the embankments against floods.SUPARCO has carried out mapping and monitoring of river and forest for the government of Sindh in order to assess natural resources in the flood plain. Figure-4 demonstrates a satellite image based map depicting landcover within the flood plain near Sukkur.

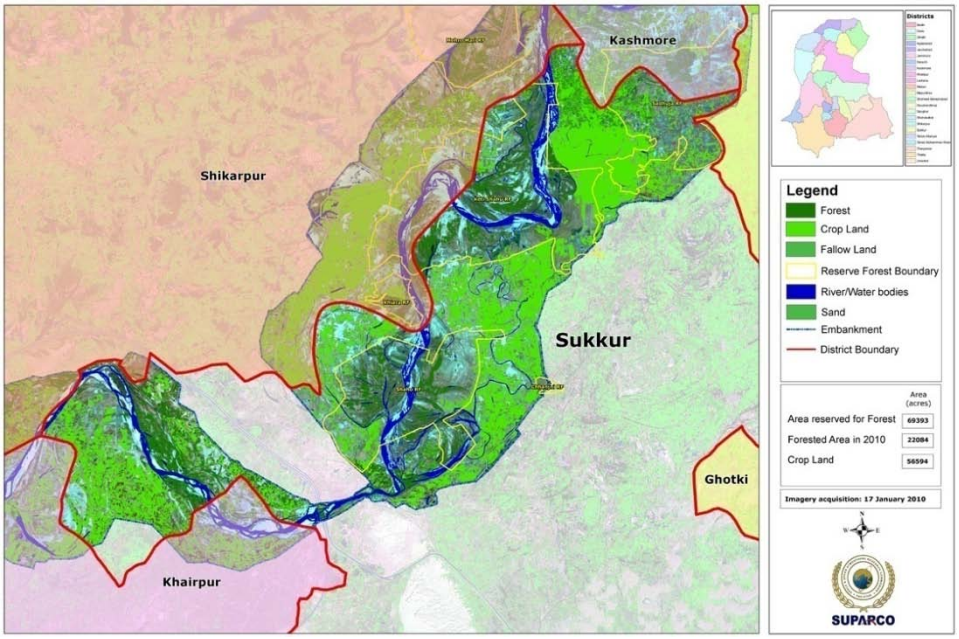

Figure 4.Landcover map of parcel of flood plain in Sindh

4. Mangrove forests are the natural shield to avert heavy loss by possible heightened waves, cyclone and tsunami. Their roots and stems absorb shocks of the tides and transform them to a gentle stage. Mangrove forests also provide the breeding ground for fish, sanctuary for migratory birds and livelihood to fishermen. Satellite images were analysed to locate and map outmangrove forests along the coast of Pakistan.Figure-5 shows the distribution of mangrove forests along coast of Pakistan while Figure-6 depicts mangrove forest in Indus delta. SUPARCO is also continuously monitoring the health of newly planted mangroves forests in the coastal region.

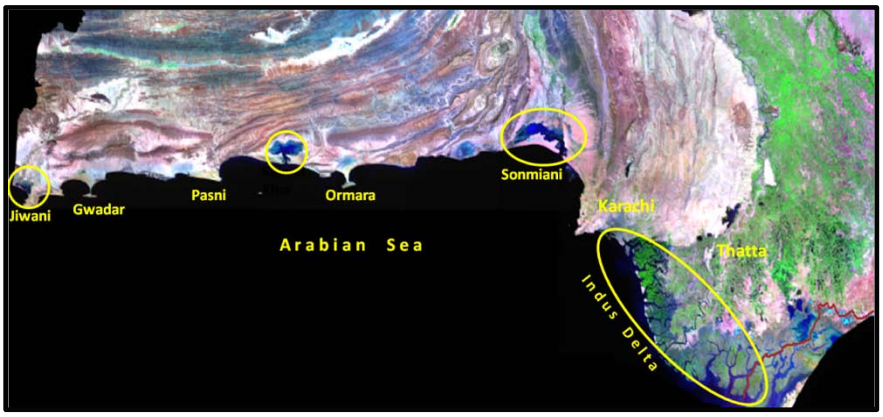

Figure 5. Mangrove forest distribution along coast of Pakistan

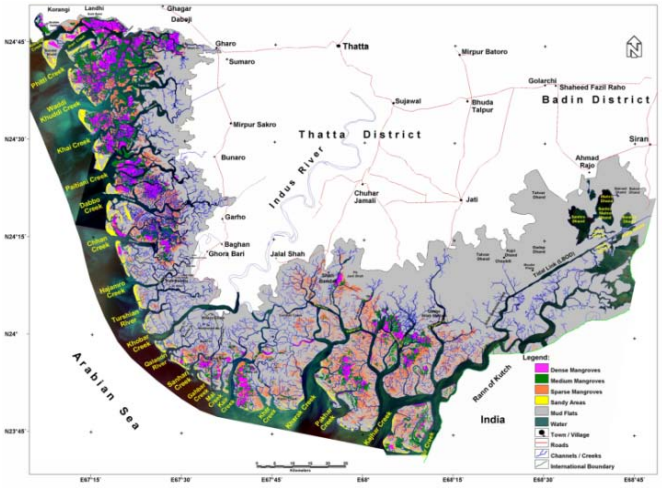

Figure 6.Mangrove forests along Indus Delta

Conclusion

The use of Remote Sensing has been highly beneficial in the identification and mapping of forest in Pakistan.The information derived is of vital importance for better planning and management for forest of all types.Employment of RemoteSensing technology can greatly assist not only in regular monitoring of forest, but in selection of new sites for aforestation drive to increase the forest cover in line with national requirements.