Assessment of Deforestation and Forest Degradation in the Blue Nile Region, Sudan (1996-2005), Using Remote Sensing and GIS Techniques

Mustafa M. El-Abbas* and Elnour A. Elsiddig
Faculty of Forestry, University of Khartoum, Shambat, Sudan

ABSTRACT

Land use/land cover (LU/LC) changes, particularly deforestation and land degradation, are one of the challenges that face the forest sector in Sudan and create the need for well-designed information systems and management plans. To cope with this issue, the efficiency of successive forest inventories was tested in the Blue Nile region, in particular Karkoj map sheet. Part of the data was obtained from a field survey conducted within the framework of an AFRICOVER project in 1996. In order to estimate the changes, a field mission was executed in 2005 to revisit the same plots determined previously. Earth Observation (EO) data in form of LANDSAT scenes were used to assess the estimated results achieved, based on the terrestrial forest inventories. For precise estimate, the EO data were taken in periods which coincide with the field survey data acquisition dates and season. At the LU/LC information level, the results obtained from the two applied methods were highly correlated. Meanwhile, the results taken from the two successive inventories (1996 and 2005) gave detailed information about the vegetation cover (e.g. species composition, regeneration, age, etc.). In the map sheet under investigation, the results showed that forest land was drastically decreased from 47.1% to 17.7% during the studied time period. Moreover, the study indicated that some of valuable tree species disappeared (12 tree species were recorded in 1996 compared with only 5 in 2005), and the number of stems per unit area also decreased from 116 to 105 per hectare. The conversion of forest into agricultural fields and grassland was a main force of deforestation. In conclusion, remote sensing and GIS are efficient tools to estimate the large-scale LU/LC and its dynamics in timely and cost-effective manner.