

Application of geoinformatic tools for monitoring of protected areas

Krystyna Michalowska
Ewa Glowienka-Mikrut

AGH, Department of Geoinformation, Photogrammetry and Environmental Remote Sensing
University of Science and Technology in Cracow

The article presents the problems related to the method of processing and preparing data recorded by means of various sensors and in various formats for implementation in one system GIS (Geographical Information System). Integrated spatial and temporal data made it possible to monitoring the states of the of selected elements of the Slowinski National Park (SPN) environment occurring over decades since 1951 year till now. The study concerns the territory of the SPN, located in the middle part of the Baltic Sea coast in north of Poland. More than half of the area of the Park is taken up by the sea and lakes. The specific character of the Park stems from the moving dunes existing on the spit, which move at the pace of 3-10m/year. The exceptionally strong soil dynamics and limited accessibility of the land make research in the area of SPN very difficult. Application of modern remote sensing techniques and working in the GIS environment enables the comprehensive and permanent character of research based on permanent experimental areas. The possibility to study and analyse changes occurring over decades is provided by multi-temporal aerial photos, taken in the years 1951-2004 and the satellite images (Landsat, Aster). Moreover, there were used multi-temporal orthophotomaps and Numerical Terrain Models.

The article presents research aimed at assessment of the possibility of using multi-temporal vegetation indices – NDVI (Normalised Difference Vegetation Index) in the study of the variability of selected elements of the environment on the example of the monitoring of changes of the coastal area of the SPN lakes and the movement of dunes.

The lakes in the Slowinski National Park, beside the coastal dunes, constitute one of the basic landscape features and account for almost 30% of the total area of the Park. Over the years, there was observed the process of successive diminishing of the area of lakes as a result of constant shallowing and overgrowing by vegetation. In the research, database was composed of satellite photos and NDVI normalised vegetation index from 1979 and 2000, multi-temporal orthophotomaps from aerial photos and a vector map of water resources. The generated differential NDVI map made it possible to locate the areas, where there took place dramatic changes in the land cover and specify the character of the processes causing the transformations. Aerial orthophotomaps reflecting the situation in five subsequent decades from 1964 to 2004 enabled delineation of coastlines of the lakes, and then determination of the pace and degree of transformation of the surface of the examined water basins and enabled

tracing the movement of dunes. Moreover, orthophotomaps from the period of 1975 and 2004, as well as the vector maps of the coastline of the lakes developed on their basis, made it possible to verify the results of the analysis of the differential NDVI map.