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LANDSCAPE CHANGES IN THE VICINITY OF KHMELNITSKA NUCLEAR POWER PLANT BY REMOTE SENSING DATA ANALYSIS

Landscape cover changes assessment has become a popular study these days as understanding landscape patterns, changes and interactions between human activities and natural phenomena can be very useful for better land management and decision-making improvement.

The current landscapes through all over the country were formed by their rich human history. Most natural drivers are continuously exposed to and transformed by human intervention in the form of agricultural and industrial activities, forestry, rural policies, water management, settlements, and other. In our case the degree of human influence has been particularly strong and led to significant changes. In this research we paid our attention to landscape changes in the vicinity of nuclear facilities, namely within the Khmelnitska nuclear power plant (KhNPP).

The landscapes of researched territory are referred to the mixed coniferous-broad-leaved forests and characterized by the following specific features: lowland relief, predominance of sandy and sandy-loam anthropogenic sediments; moderate continental climate with the positive moisture balance (favourable for the dense hydrological network with the wide swampy river valleys); prevalence of mottled soils. In general, the landscapes of this zone are the least anthropocentric changed as compared with the other landscapes (especially with the Ukrainian forest-steppe and steppe zones) [1]. A characteristic feature of the soil cover is its mottling. The soils of one type do not occupy continuous massifs and often are changed with the soils of other types. It determines the high mottling of the landscapes. On the one hand this fact complicates the use of such landscapes; on the other hand it provides the availability of weakly transformed landscape complexes.

To assess preliminary the landscape cover changes within the area adjusted to the KhNPP the Landsat-4-5 TM (acquired on 22 July, 1994) and Landsat-8 OLI (acquired 02-11 July, 2016) multispectral images were taken to obtain spatial distribution of the main land cover types within the researched territory [2]. The following land cover types were detected and analyzed; their description is given in the table 1.

Table 1 –Land cover types detected and analyzed in the vicinity of the KhNPP

Land cover type	Description
Water bodies	Clear freshwaters of lakes, Goryn' river and its tributaries
Coniferous forests	Woodland and forest dominated mainly by spruce (Picea) and pine (Pinus)
Broad leaved forests	Woodland reflects mixed forest and forest-steppe ecosystem: forests and sparse vegetation, mainly maple (Sapindaceae), willow (Salix), lime (Tilia), oak (Quercus)
Natural grasslands	Herbaceous vegetation in pastures and hay meadows with significant areas of agriculture
Farmland	Plantations of sunflower, sugar beet, soybeans, winter wheat, maize with and houses adjoining sites
Open soil	Arable and barren (sand, clay) territories without vegetation cover
Industrial (artificial) area	Housing (residential), industrial (KhNPP) and commercial areas, characterized by asphalt, concrete, steel and slate cover

In general, significant changes in proportional distribution of the land cover types had not happened because of uniformity of most of the territory. Comparing classification of land cover types for the period of 22 years of the KhNPP operation (1994-2016) we can make a conclusion that the industrial area (including housing-residential, industrial (KhNPP) and commercial areas) has been increased. Water bodies' volume has not been significantly changed. Further research will be directed on the same territory analysis but with the other space images source and deeper understanding of natural resource management in the vicinity of the KhNPP.

References

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