ASSESSMENT OF THE OCNELE MARI SALT MINE EXPLOITATION IMPACTS ON THE VEGETATION COVERAGE USING MULTISPECTRAL REMOTE SENSING DATA

Violeta POENARU[1], Alexandru BADEA[1, 2], Elena SAVIN[3]

[1]Romanian Space Agency, 21-25 Mendeleev Str., 010362, Bucharest, Romania, +40-213168722; +40 – 21 3128804; violeta.poenaru@rosa.ro;
[2]University of Agronomical Science and Veterinary Medicine, 59 Marasti Blv., 011464, Bucharest, Country, +40 – 213182266, +40-213182888, alexandru.badea@rosa.ro;
[3]National Meteorological Administration, 97 Bucharest – Ploiesti Road, 013686, Bucharest, Romania, +40-213183240, +40-213163143, elenas_54@yahoo.com

Abstract

In Romania there are several inactive or abandoned mine sites which can create a significant impact on the environment, affecting the use of local surface and groundwater. The environmental impacts that can occur at an abandoned mine site can be divided into several categories, amongst which: metal contamination of ground/ surface water and sediments, air emission and deposition, erosion, physical impacts (slope failure, structural stability of tailings impoundments, ground subsidence, unsafe structure, mine openings and vegetation contamination). The Ocnele Mari salt mine is one of disused mines affected by subsidence phenomena as a result of pillars dissolution by uncontrolled leaching processes that led to the formation of a huge cavern of up 10 .5 ha on horizontal direction and its volume of 2.5 million m^3 of brine. There is a interlink between land deformation (subsidence and landslide) phenomena and vegetation changes.

The object of the present study is to investigate the temporal changes of vegetation caused by salt exploitation using multispectral remote sensing data (Landsat 5, Landsat 7, ASTER and MODIS). There are elaborated maps for the vegetation indices: normalized difference vegetation index - NDVI, leaf area specific index – SLAVI, normalized difference water index - NDWI - and termic index. Change detection technique in vectorial format is applied on NDVI data to determine the areas affected by land degradation having direct effects on vegetation coverage. Thus, an analysis of vegetation index NDVI proves the vegetation degradation in Field II of probes of the mining area, especially in area of the 360-366 probes, with an area of 146700 m^2. For the Field I of probes, sample 472, there is to be noticed a decrease of 19 800 m^2 of vegetation, while the third field, samples 431-433, the decrease is determined to 30 600 m^2. The results confirmed the feasibility of using remote sensing technique to assess the vegetation growth status in the salt mining area.