

REMOTE SENSING ANALYSIS OF THE ENVIRONMENTAL CHANGES IN A POST-MINING AREA: A CASE STUDY OF THE OLKUSZ REGION

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Keywords: mining impacts, spectral indices, open-access satellite imagery

Olkusz-Pomorzany mine was closed at the end of 2020 after 46 years of activity. The closure of the mine included shutting down the water pumps, which resulted in the restoration of the underground water table and subsequent water appearing on the surface of the post-mining and adjacent areas. The occurrence of this phenomenon years after the end of mining activity highlights the importance of continuous monitoring of post-mining areas.

The aim of this study is to analyze spatio-temporal water and vegetation changes in the post-mining and adjacent areas using remote sensing techniques on open-access satellite imagery data.

According to the literature study, the first occurrence of water in the Olkusz region was observed in the first half of 2023. This study uses 9 satellite images from Sentinel-2 captured between 2022 and 2024. Preliminary visual analysis and public reports review led to the choice of two study areas: Hutki and Bolesław areas where subsidence lakes occurred. Based on the literature, two spectral indices were selected for the identification of surface water and analysis of vegetation condition: MNDWI (Modified Normalized Difference Water Index) and NDVI (Normalized Difference Vegetation Index). The change of spatial extension of water and vegetation over time was calculated based on results obtained from the indices

Results show that in the Hutki area water began to appear at the end of 2023, and by September 2024 four subsidence lakes had formed with a total area of approx. 190 000 m² (6.5% of the analyzed area). Healthy vegetation cover decreased by 300 000 m² (9.9% of the analyzed area). In Bolesław water was observed at the beginning of 2023, in September 2024 water covered almost 200 000 m² (17.3% of analyzed area). The obtained results indicate that the selected spectral indices allow the detection of surface water bodies and spatiotemporal analysis of changes in the area of surface water and vegetation. Research provided insights into post-mining environmental impacts in the Olkusz region.