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Spatiotemporal evolution and renewable energy potential in coal regions in transition

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The WINTER project, funded by the EU, aims to develop a web GIS interactive platform that will be used as a tool for the management of coal regions in transition. The platform will guide and engage stakeholders by sharing best practices and addressing transition challenges in pilot regions at different transition stages. The applied methodology involved a three-step process: 1) developing a geodatabase to import and standardize geospatial datasets; 2) training and implementing a Machine Learning (ML) approach [1]; and 3) identifying and quantifying land cover (LC) changes from 2018 to 2021. Particularly in Western Macedonia (Greece), the Amynteo mine, illustrated a green transition (Figure 1), converting mining areas to bare soil, vegetation and water bodies, indicating strong reclamation potential. In contrast, the Ptolemaida mine, still operational, illustrated minimal land cover changes. In Poland and specifically, in Konin region results highlighted mining expansion, affecting agricultural and wetland areas. On the other hand, the Kazimierz mine, which is already at a closure phase, exhibited a significant green transition, with a marked increase in vegetation land cover.

The following step was the assessment for the potential for Renewable Energy Source (RES) implementation utilizing, open-source geospatial datasets, considering factors like elevation/slope, wind speed, solar radiation, and land cover/land use were used. Scenarios were designed to identify preliminary suitable areas for Photovoltaic (PV) and Wind Parks (WP) installations. In Western Macedonia, potential sites were identified adjacent to the Ptolemaida mine limits, with a significant area suitable for PV parks. In Konin, the analysis within mine boundaries revealed similar suitability for PV and WP, showing the highest potential for RES implementation. Specifically, in Western Macedonia, the potentially suitable areas for PV was higher, up to 34% of the total studied area, in contrast to the 12%-18% range observed in Konin's mines. Additionally, the potentially suitable sites for WP in Western Macedonia seem to be related due to geomorphological differences, whereas in Konin, the suitability analysis based on results within the boundaries of the open-pit mine.

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[1] Krassakis, P.; Karavias, A.; Nomikou, P.; Karantzalos, K.; Koukouzas, N.; Kazana, S.; Parcharidis, I. Geospatial Intelligence and Machine Learning Technique for Urban Mapping in Coastal Regions of

South Aegean Volcanic Arc Islands. Geomatics 2022, 2, 297-322. https://doi.org/10.3390/geomatics2030017