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Monitoring Land Cover Dynamics in Bahr Qarun District, Egypt, via Remote Sensing Data

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Accurate monitoring of land cover is essential for sustainable environmental management and urban planning in arid regions. However, rapid changes in land use often make it difficult to distinguish between different surface types, such as urban areas and bare soil, using standard satellite data alone. This research examines land-use changes in the Bahr Qarun district of Fayoum, Egypt, during 2019, 2021, and 2023. The study used Sentinel-2 and Landsat OLI 8 satellite images taken each April to ensure data consistency. We applied the Maximum Likelihood (ML) method to classify Sentinel-2 images. They used 30 training samples for each land category to guide the process. The results achieved a Kappa coefficient above 75%, indicating a reliable level of accuracy. We measured vegetation using the Normalized Difference Vegetation Index (NDVI) and urban areas using the Normalized Difference Built-up Index (NDBI). A comparative analysis revealed that NDVI results were closely aligned with those obtained from supervised classification, reflecting its strong capability in accurately identifying vegetated areas. In contrast, NDBI exhibited a tendency to overestimate urban extent, primarily due to spectral confusion between built-up surfaces and bare soil within individual pixels. The study concludes that NDVI is an effective tool for mapping the green cover in this area.

Keywords: Land Cover Change, Sentinel-2, Landsat OLI 8, Supervised Classification, Spectral Indices (NDVI & NDBI), Bahr Qarun, Egypt.