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Analysis of land use and land cover change dynamics and its impacts on WEF Nexus Resources over a 30-Year Period (1990–2020) in Mpumalanga, South Africa

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Developing countries face a difficult challenge in ensuring secure and sustainable water, energy, and food (WEF), which is further exacerbated by the rapidly land use and land cover changes (LULCC). This study used Land use and Land cover (LULC) derived from the South African National Land Cover Data repository for 1990 and 2020 datasets in deepening an understanding of the impact of LULCC on WEF nexus resources. Between 1990 and 2020, mines&quarries and built-up areas increased by 30.19% and 40.89%, respectively. The transition matrix based on post-classification comparisons shows that 12.42% of grasslands in 1990 were converted into agriculture in 2020. The observed LULCC dynamics were attributed to socio-economic growth and extreme climate events. This approach had various advantages (e.g., understanding WEF nexus change dynamics in a spatial-explicit manner), and providing a novel methodology that enables collaborative assessment of nexus resources with respect to the environment.