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## Detection of Land-Use and Surface Temperature Change at Different Resolutions

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Author(s)

El-Sayed Ewis Omran

### ABSTRACT

Understanding the relationship between land-use/land-cover change (LULCC) and environment is seriously important to manage arid land. However, information on how environmental factors influence the LULCC patterns at different scales in arid area is lacking. This paper investigates the application of RS/GIS for detecting LULCC and assessing its impact on surface temperature in the Ismailia Governorate, Egypt. Landsat images have been utilized to quantify the changes from 1984 to 2011. The images were pre-processed using calibration techniques and the geometric and atmospheric corrections were performed. Different ratios, indices, and optimized index factor were implemented to decide the best band combination. Supervised classification using Maximum Likelihood technique and spatial reclassification have been employed. Six land-use/land-cover categories (urban, vegetation, waterlogged 1 and 2, bare land, and water) were identified. The highest overall accuracy and Kappa coefficient is 93.04% and 80.65%, respectively. The integration of RS and GIS was further applied to examine the impact of land-use change on surface temperatures. The results revealed a notable land-use change in the study area. The Built-up area has rapidly increased in Ismailia during the 27 years period. The built-up area (37.65°C in 1984 and 43.876°C in 2011) and Barren land (37.34°C in 1984 and 42.801°C in 2011) exhibit the highest surface radiant temperature, while vegetated surfaces (28.73°C in 1984 and 32.96°C in 2011), water (25.94°C in 1984 and 27.32°C in 2011), waterlogged1 (34.54°C in 1984 and 35.60°C in 2011) recorded low radiant temperature respectively. Waterlogged2 is the class that shows an unexpected radiant temperature (26.38°C in 1984 and 27.75°C in 2011). The urban development between 1984 and 2011 has given rise to an average of 6.23°C in surface radiant temperature. During 27 years, the change rate of land-use types which are decreased are barren land (1.12% annually) and waterlogged1 and 2 (0.76 and 6.61% annually). The area of vegetation, water, and built-up are increased by 0.98%, 0.82%, and 0.61% per year, respectively.

### KEYWORDS

Remote Sensing; GIS; Landsat Image; Land-Use; Change Detection; Surface Temperature; Ismailia

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