

The Effect of Land-cover Change on the Urban Heat Island Phenomenon: Nile Delta Case Study

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On warm summer days with clam winds, the temperature in the city is usually higher than surrounding areas. This phenomenon is called Urban Heat Island (UHI) and it occurs mainly due to the presence of fewer trees and other natural vegetation to shade buildings, block solar radiation and cool the air through evapotranspiration in urban areas. This phenomenon increases: discomfort for local residents, the demand for energy needed to cool homes and buildings and the amount of ground level ozone (smog). Therefore it is clear that not only does UHI has a negative impact on local residents and the environment but also it has an economic cost. The Nile Delta is one of the oldest intensely cultivated areas on earth. It is very heavily populated, with population densities up to 1600 inhabitants per square kilometer. The low lying, fertile floodplains are surrounded by deserts. Only 2,5% of Egypt's land area, the Nile delta and the Nile valley, is suitable for intensive agriculture. The continuous and rapid change in its urban fabric and the associated informal development has resulted in the severe damage of the delta's environment. Among those effects is the increase in the UHI phenomenon. Although, many studies have used remotely sensed imagery to record the UHI in towns and cities of the developed world, similar studies on developing world are rare. The main objective of this paper is to test the effect of the change in Nile delta's land-cover on the UHI phenomenon. For this, two Landsat images (acquired in 1984 and 1999) are classified to produce two land-cover maps. Also, the thermal band, in each image, is used to produce the Land Surface Temperature (LST) map at the time of acquisition. The LSTs maps are used to compare the change in LST over a period of ten years and then this change is analysed and linked to the correspondent land-cover maps. Finally, the UHI in Nile delta are compared to results obtained from similar results that were carried out in the developed world. Initial results indicate that there is an obvious increase in the LST and consequently the UHI phenomenon is more obvious. From the carried out analysis it is clear that the urbanization in parts of the Nile delta had raised the LST more than in areas that had witnessed less or no urbanization. Finally the analysis have clearly shown that the UHI is more obvious in Nile delta than in other areas.