Plinius Conference Abstracts,
Vol. 10, PLINIUS10-A-00127, 2008
10th Plinius Conference on Mediterranean Storms

Exploring the need for monitoring urban growth in catchment areas in Cyprus using multi-temporal remotely sensed data

D.G. Hadjimitsis (1)

Department of Civil Engineering and Geomatics, Cyprus University of Technology , Lemesos, Cyprus

(d.hadjimitsis@cut.ac.cy / Fax: ++00357 25 002661)

Effectively monitoring and simulating urban growth and its effects on land-use patterns and hydrological processes in an urbanized watershed are essential to effective land-use and water resource planning and management. Remote sensing provides spatially consistent data sets for large areas with both high spatial detail and temporal frequency. Moreover, remote sensing techniques have already shown their value in mapping urban areas, and as data sources for analyzing and modeling urban growth and land-use change and hydrology. Indeed, this paper highlights the beneficial use of remote sensing in monitoring urban growth especially in the vicinity of catchment areas. The severe weather conditions that lead to the occurrences of flood event on the 30^{th} of October 2006 in the Paphos District (Cyprus) in the area covered near the Agriokalamin River in Kissonerga-Tala-Emba-Tremithousa Villages (located south-west of Paphos), alerts the governmental officers to investigate the causes of this event by considering urbanization and changes in land-cover as the predominant possible factor that triggers such flood event. The catchment area was measured based on the on-site visits and the use of topographical maps to be 7.5 sq. km. The degree of urbanization (buildings, road infrastructure etc. marked as urban area) based on the results found by applying the unsupervised classification technique, has been determined by using the following remotely sensed data: aerial photos, Landsat-5 TM and ETM+ and Quickbird satellite images. The following four classes have been used the 'unsupervised classification algorithms': - vegetation (thinly vegetation), asphalt area,

buildings, water, and bare soil. Urbanization factor has been determined such as the following: for the aerial photo acquired on 1963, the urbanization factor was 0.9 %, for the Landsat TM images acquired on 1985, 1987, 2000, 2001 was 6%, 7.2 %, 11.8 %, 12.2. % and for the Quickbird images acquired on 2003 and 2007 was 16 % and 27 % respectively. It is apparent that a dramatic change in the building activities was occurred in the last years especially for the Tala area. Estimated number of buildings for Kissonerga Village for the 1982 and 2002 were 256 and 665 respectively (38.5 % increase). By comparing the urbanization factors found from the classified images acquired on 1985 and 2003 (the nearest dates), urbanization factors of 6 and 16 % was found (i.e. 38.5 % increase). It is apparent that both indicative results were much closed. Our results clearly illustrate that tremendous urban development that has taken place over the last 44 years. A flood risk assessment was performed with some preliminary results shown that Tala Village area was the most high-risky area than the others. The results of this study will encourage decision makers or the local authorities to consider the tool of remote sensing for monitoring on a systematic basis the land-cover changes in all the catchment areas around the whole area of Cyprus by taking into consideration some other hydraulic data that will assist the formulation of flood risk assessment studies.