

Post-Soviet LULC Analysis of Tbilisi, Batumi and Kutaisi Using of Remote Sensing and Geo Information System

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Abstract : Human is a part of the urban landscape and responsible for it. Urbanization of cities includes the longest phase; thus none of the environment ever undergoes such anthropogenic impact as the area of large cities. The post-Soviet period is very interesting in terms of scientific research. The changes that have occurred in the cities since the collapse of the Soviet Union have not yet been analyzed best to our knowledge. In this context, the aim of this paper is to analyze the changes in the land use of the three large cities of Georgia (Tbilisi, Kutaisi, Batumi). Tbilisi as a capital city, Batumi as a port city, and Kutaisi as a former industrial center. Data used during the research process are conventionally divided into satellite and supporting materials. For this purpose, the largest topographic maps (1:10 000) of all three cities were analyzed, Tbilisi General Plans (1896, 1924), Tbilisi and Kutaisi historical maps. The main emphasis was placed on the classification of Landsat images. In this case, we have classified the images LULC (LandUse / LandCover) of all three cities taken in 1987 and 2016 using the supervised and unsupervised methods. All the procedures were performed in the programs: Arc GIS 10.3.1 and ENVI 5.0. In each classification we have singled out the following classes: built-up area, water bodies, agricultural lands, green cover and bare soil, and calculated the areas occupied by them. In order to check the validity of the obtained results, additionally we used the higher resolution images of CORONA and Sentinel. Ultimately we identified the changes that took place in the land use in the post-Soviet period in the above cities. According to the results, a large wave of changes touched Tbilisi and Batumi, though in different periods. It turned out that in the case of Tbilisi, the area of developed territory has increased by 13.9% compared to the 1987 data, which is certainly happening at the expense of agricultural land and green cover, in particular, the area of agricultural lands has decreased by 4.97%; and the green cover by 5.67%. It should be noted that Batumi has obviously overtaken the country's capital in terms of development. With the unaided eye it is clear that in comparison with other regions of Georgia, everything is different in Batumi. In fact, Batumi is an unofficial summer capital of Georgia. Undoubtedly, Batumi's development is very important both in economic and social terms. However, there is a danger that in the uneven conditions of urban development, we will eventually get a developed center - Batumi, and multiple underdeveloped peripheries around it. Analysis of the changes in the land use is of utmost importance not only for quantitative evaluation of the changes already implemented, but for future modeling and prognosis of urban development. Raster data containing the classes of land use is an integral part of the city's prognostic models.

Keywords : analysis, geo information system, remote sensing, LULC

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