Coastal Change Detection Using Different Remote Sensing Approaches

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Monitoring of coastline regions is a vital issue in assessing ecological changes on local and global basis as these areas are the main climate and bio system regulators. A range of natural and contrived processes run comparatively fast along coastal lines causing quantifiable changes that can be detected over different lengths of time. Particularly, all demographic changes are strongly related to shoreline transformation rates. As in Istanbul, where the inhabitants' number is constantly growing, the Pre-Bosphorous coastal zone of the Black Sea is challenged with numerous and frequent deformations.

In this study, it is aimed to reveal the coastline and coastal area changes based on the open-pit mining activities in village of Kilyos that is located in the north of Istanbul. The lack of strict national regulations on solid mining and waste disposal set off practically irreparable conditions and changes in the region's ecosystem. The absence of reclamation activities caused the depleted mine sites to turn into malformed artificial lakes. Furthermore, tipping the excavated soil into the sea, gravel dredging changed the natural coastline formations to great extent in the region.

Various image processing and land use / cover classification methods are utilized with the intention to investigate the coastline and coastal area changes of the Pre-Bosphorous coastline of the Black Sea. By means of employing multitemporal Landsat series satellite images, the change detection is obtained through exploiting traditional and comparatively new approaches. Image subtraction, image ratio and methods of change detection after classification are used. For performance evaluation of the work manual vectorization, feature extraction after applying segmentation techniques (threshold and object-based) are also utilized. At the end, the advantageous and the limits of each proposed method were assessed along with the evaluation of the individual accuracies obtained. Each extracted coastline result is compared to Google Earth images (where it is applicable), or to the pansharpened multispectral ETM+ and panchromatic ETM+ images (where higher resolution data is not available). The assessment is carried out through visual interpretation. The performance of methods was compared in different scopes, the advantageous and limits were outlined.