

Abstract

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Evaluating Shoreline, Urban and Roads Changes in the Hurghada Area, Egypt, Using Multispectral Satellite Images

The Red Sea is one of the most important repositories of marine biodiversity all over the world. It is the habitat of over 1,000 invertebrate species, more than 1200 species of fishes, and 200 soft and hard corals. Egypt's Red Sea coast is an area that has been targeted and developed for tourism purposes. It is largely dependent on the surrounding environment such as sand and water quality, and especially coral reefs, which are sensitive to tourist activity, with low government control in the area and growth in private investments. The objective of this paper is to investigate coastal changes at Hurghada coastal area using remote sensing technique. Three satellite datasets, Landsat Thematic Mapper (Landsat 5 TM), Landsat Enhanced Thematic Mapper Plus (Landsat 7 ETM+) and Terra / Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER), acquired during years 1984, 1992, 2004 and 2011, respectively, were used to detect and evaluate Hurghada's coastal changes. Five change detection techniques were tested to detect areas of change. The techniques considered image differencing, image ratio, image overlay, multivariate Principal Component Analysis (PCA) and post-classification comparison. The post-classification comparison was found to be the most accurate procedure and produced three Land Use / Land Cover (LULC) maps of the years 1984, 1992, 2004 and 2011 with overall accuracies of 87.8%, 88.9%, 92.0% and 94.1% respectively.