

The Use of Landsat and Aerial Photography for the Assessment of Coastal Erosion and Erosion Susceptibility in False Bay, South Africa

Kerry Callaghan¹ Jeanine Engelbrecht² Jaco Kemp¹

¹Department of Geography and Environmental Sciences, Stellenbosch University, Stellenbosch, South Africa, kerrylee37@gmail.com

²CSIR Meraka Institute, Stellenbosch, South Africa

DOI: <http://dx.doi.org/10.4314/sajg.v4i2.1>

Abstract

Coastal erosion is a worldwide hazard, the consequences of which can only be mitigated via thorough and efficient monitoring of erosion. This study aimed to employ remote sensing techniques on aerial photographs and Landsat TM/ETM+ imagery for the detection and monitoring of coastal erosion in False Bay, South Africa. Vegetation change detection as well as post-classification change detection were performed on the Landsat imagery. Furthermore, aerial photographs were analysed using the Digital Shoreline Analysis System (DSAS), which determines the identification of changes in landcover conditions leading to an increased susceptibility to erosion. Notably, the post-classification change detection indicated consistent statistical differences in shoreline position over time. The results showed that while the resolution of the Landsat imagery was not sufficient to quantify and analyse erosion along the beach itself, the larger area covered by the satellite images enabled increases in built-up areas, while sand dune, beach, and sand (not beach) decreased. NDVI differencing led to the conclusion that vegetation health was decreasing while reflective surfaces such as bare sand and roads were increasing. Both of these are indicative of an increased susceptibility to coastal erosion. Aerial photographs were used for detailed analysis of four focus areas and results indicated that coastal erosion was taking place at all four areas. The higher resolution available on the aerial photographs was vital for the quantification of erosion and sedimentation rates.