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Posidonia Oceanica habitat mapping in shallow coastal waters along Losinj Island, Croatia using Geoeye-1 multispectral imagery

Seagrasses are important components of marine ecosystem. They are a primary food source for many organisms and provide shelter and nursery areas for many more. Also they stabilize sediments and act as a natural barrier against coastal erosion. But despite their valuable rule, Seagrasses are facing large threats because of human development. The stresses caused by human activities like trawling and anchoring, seabed mining, gas or mineral exploration and production, industrial chemical waste, agricultural run-off and coastal development results in a worldwide decline of seagrass meadows coverage.

In this thesis, a study was carried out using Geoeye-1 satellite data acquired on July and August 2011 to extract bottom type features, i.e. seagrass (Posidonia Oceanica), sand and rock in shallow coastal waters of Losinj Island, Croatia.

To conduct the study, atmospheric correction, glint removal and water column correct were done to remove the noise from the seabed reflectance but due to some quality problems (sensor calibration) with the imagery dataset prevented us to get satisfactory results from glint removal and water column correction. These techniques are based on empirical models among different band pairs and in the case of a problem in making an accurate reflectance values, their result would be unreliable. So it was decided to perform a principle component analysis to improve the spectral separability of desired classes. Then a hard supervised classification was performed to identify the spectral clusters and label them based on the training phase of the classification algorithm. But before running the classifier to compensate the attenuation effect of water body, it was decided to consider each training sample as a separate class and afterwards reclassify the results into our primary classes.

At the end of the classification result were edited using a majority filter to reduce the salt and pepper effect of the classification results and the accuracy of the classification was calculated for each scene. Afterwards a mosaic was produced from the classification results. The overall accuracy of the mosaic and its kappa coefficient was calculated as 80% and 0.7 respectively which proved that the classification was successful and Geoeye-1 imagery can be used reliably to identify the extent of seagrass community in a fast and cost-effective way.

Keywords: Geography, Physical geography, digital image processing, benthic habitat mapping, Geoeye-1 satellite imagery, Posidonia Oceanica.

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