MAPPING KENYAN MANGROVES WITH VERY HIGH RESOLUTION QUICKBIRD SATELLITE IMAGERY

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Mangroves are in worldwide decline. A valuable tool in the detection of mangrove degradation is satellite imagery. We focus on a tropical bay in Kenya, Gazi Bay, on which very high resolution QuickBird satellite imagery is available.

A first objective was to classify the mangroves at species level using unsupervised and supervised (hard and soft) per-pixel classification techniques. Incorporation of texture and normalized difference vegetation index (NDVI) measures in image classification both increased the spectral separability between the image classes, but this was not indicative for the accuracy of the classification. On the contrary, the supervised fuzzy classification of the contrast-stretched multispectral image using a 3x3 pixels convolution window appeared to be the most accurate one (based on visual image interpretation and field knowledge). The accuracy of the supervised classification (using the maximum likelihood decision rule) of the contrast-stretched multispectral image was assessed using the Point-Centred-Quarter-Method (PCQM) transect data. The overall accuracy was found to be 68%.

Secondly, automated methods for vegetation assemblage delineation were developed using fuzzy convolution techniques. The automated delineation was compared with the visual delineation done by 3 naïve interpreters. Results showed that there were two possible disagreements between automated assemblages and visual assemblages: more than one automated assemblage could be included in a visual assemblage and vice versa, but overall the boundaries of the automated assemblages corresponded quite well with the visually delineated polygons. The correspondence between these delineations could however not be quantified.

We can conclude that it is possible to create a mangrove species map of adequate accuracy through supervised classification of the QuickBird satellite image and to automatically identify assemblages. Therefore QuickBird satellite imagery has proven to be a valuable tool in the early detection of mangrove degradation in which floristic composition is as important as areal extent.