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.