

## Monitoring Land Use Changes and their Impacts on the Productivity of Negombo Estuary, Sri Lanka Using Time Series Satellite Data

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### Abstract

The changes of land area and vegetation cover in the channel segment of the Negombo estuary, Sri Lanka from 1987 to 2009 were assessed with the multivariate alteration detection (MAD) algorithm using multi-temporal satellite images of Landsat TM, ETM+ and ASTER. Changes in chlorophyll a (Chl-a) distribution were also studied using time series Landsat satellite data. The study successfully detected changes in land area and vegetation cover during the study period. Results indicated that the channel area of the Negombo estuary had significantly reduced during the study period with rapid changes from 2000 onwards. A notable increase in land area in urbanised areas around the channel segment and an increase in the density of mangroves around some islets were also detected. New islets have also formed in the channel segment during 1987-2009. The results also indicated that during this period there was a significant increase of Chl-a content especially in water stagnant areas at Kuda Ela and Madabokka, leading to localised eutrophication. This information will be useful to identify the areas with high eutrophication and remedial action could be taken well in advance in order to mitigate sudden fish kills that frequently occur in such areas.

### Introduction

Change detection is the process of identifying differences in the state of an object or phenomenon by observing it at different times (Singh, 1989). A variety of digital change detection techniques has been developed and basically, the different algorithms can be grouped into the following categories: algebra (differencing, rationing, and regression), change vector analysis, transformation (e.g. principal component analysis, multivariate alteration detection, Chi-square transformation), classification (post-classification comparison, unsupervised change detection, expectation-maximisation algorithm) and hybrid methods (Coppin et al. 2004; Mas, 1999 and Singh, 1989).

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