Mapping of seagrass beds and cover change analysis using Landsat imageries, Gazi bay Kenya

Mohamed Ahmed Hussein

Vrije Universiteit Brussel, Box 394, Henri Schoofslaan 12, 1160 Audeghem, Belgium
E-mail: ahmedhusseinmzee@gmail.com

Global climate change as a consequence of increasing anthropogenic emissions is one of the most contested yet more pervasive threats to marine ecosystems. However, the ocean's ability to sequester and store significant amounts of carbon due to coastal ecosystems such as mangroves, tidal marshes and seagrasses collectively labeled "coastal blue carbon ecosystems" makes it possible for us to tackle this problem. Of particular interest are seagrass meadows which are now starting to be recognized as important carbon sinks that not only trap and store organic carbon generated within the seagrass beds but also trap and bury allochthonous carbon. Seagrass beds are widely distributed and provide nursery ground and habitat for marine organisms including epiphytic algae. They trap nutrients and accumulate sediments therefore improving the water quality and stabilize the bottom. Furthermore, they are a direct food source for fish and other endangered species such as turtles, dugongs and waterfowl. Nonetheless, seagrass beds are the least well-studied blue carbon ecosystems that are currently threatened to disappear due to anthropogenic activities such as eutrophication, turbidity, sedimentation and human infrastructural development in form of aquaculture and construction. In Kenya and with specific emphasis to Gazi bay, extensive research work has been done on adjacent seagrass ecosystems such as mangroves but with relatively little coverage on seagrass beds. In fact, the only official records of detailed seagrass mapping and monitoring that exist for this Bay date back to a study by Coppejan *et al.,* 1992 and Dahdouh-Guebas *et al.,* 1999; thus the conclusion that there are insufficient data for even a best guess of total seagrass coverage in Kenya. This study takes advantage of the free and open access satellite data to investigate the present cover and temporal change in seagrass bed in Gazi bay Kenya using archived Landsat data from 1997 to 2017. Processing of data involved: converting Landsat data to top of atmosphere reflectance, water column correction for light attenuation with depth, sunglint correction for easy classification, image classification using supervised methods, accuracy assessment and detection of change in cover. Maximum Likelihood classification results indicate a current total cover of approximately 647 hectares with a producer accuracy and user accuracy of over 80%. Overall the seagrass beds in the bay have decline by 574 hectares in a period of 20 years giving a rate of 47% loss. This loss can be attributed to destructive fishing practices, erosion and sedimentation.

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