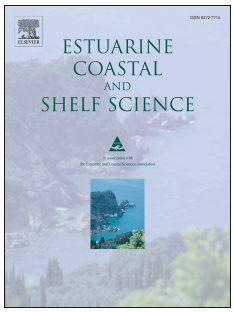
Accepted Manuscript



Assessing rehabilitation of managed mangrove ecosystems using high resolution remote sensing

Maartje Oostdijk, Maria J. Santos, Dennis Whigham, Jos Verhoeven, Sonia Silvestri

PII: S0272-7714(17)30043-4

DOI: 10.1016/j.ecss.2018.06.020

Reference: YECSS 5896

To appear in: *Estuarine, Coastal and Shelf Science*

Received Date: 15 January 2017

Revised Date: 5 June 2018

Accepted Date: 18 June 2018

Please cite this article as: Oostdijk, M., Santos, M.J., Whigham, D., Verhoeven, J., Silvestri, S., Assessing rehabilitation of managed mangrove ecosystems using high resolution remote sensing, *Estuarine, Coastal and Shelf Science* (2018), doi: 10.1016/j.ecss.2018.06.020.

Title: Assessing rehabilitation of managed mangrove ecosystems using high resolution remote sensing

Author names: Maartje Oostdijk[1], Maria J. Santos[1,2], Dennis Whigham[2], Jos Verhoeven[3], Sonia Silvestri[4,5]

Affiliations:
[1] - Copernicus Institute of Sustainable Development, Department of Innovation, Environmental and Energy Sciences, Utrecht University, The Netherlands
[2] – University Research Priority Program in Global Change and Biodiversity and Department of Geography, University of Zurich, Switzerland
[2] - Smithsonian Environmental Research Center, United States of America
[3] - Ecology and Biodiversity, Department of Biology, Utrecht University, The Netherlands
[4] - Nicholas School of the Environment, Duke University, United States of America
[5] – Dep. TESAF, University of Padova, Italy

Corresponding author: Maartje Oostdijk
Present/permanent address: Askja 270, Reykjavik, 101 Iceland

Abstract
Mangroves are valuable ecosystems for coastal protection, carbon sequestration and storage, and they provide habitat, refuge and rearing areas for many important marine species. To control mosquito outbreaks in coastal regions, mangroves were often impounded and managed using a variety of techniques that ranged from the application of insecticides to water level manipulation. Since continuous impounding had been shown to have negative effects on mangrove vegetation, other techniques have been used to manage hydrology in impoundments. A recent technique is called rotational impoundment management (RIM) and it involves flooding impoundments in summer and spring, the reproductive season of the mosquitos. In this study, we assessed the effects of 5 years of RIM management on mangrove vegetation in an impoundment on the east coast of Florida. We compared mangrove vegetation in the RIM impoundment with an adjacent impoundment that was not managed. We created a map of leaf area index (LAI) to assess vegetation productivity and its change in the two impoundments. We classified color-infrared aerial photographs from 2008 and 2010 and a WorldView-2 satellite image from 2014 to measure the extent of mangrove vegetation types and temporal changes in the two impoundments. We found a 38% increase in cover of dense mangrove vegetation after five years for the RIM-impounded area. Classification accuracy was around 80% for all imagery. The increased growth of plants and cover of dense mangroves in the RIM impoundment was corroborated by observed leaf area index values. Overall, the study demonstrates that vegetation in the RIM impoundment is becoming denser and in the near future will probably become similar to an impoundment that is open to tidal exchange or mangrove dominated areas that are not impounded.

Keywords: Mangroves, Impoundments, aerial photography, classification, WorldView-2, mangrove LAI