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TITLE: Change and fragmentation trends of Zhanjiang mangrove forests in southern China using multi-temporal Landsat imagery (1977?2010)

AUTHOR: ['M.S. Li', 'Lijun Mao', 'Wenjuan Shen', 'S.Q. Liu', 'Anshi Wei']

ABSTRACT:

Mangrove forests, which are found in saline coastal environments around the tropical and subtropical latitudes, are among the most productive terrestrial ecosystems in the world and provide valuable ecological and societal goods and services. The objective of this work was to characterize the spatio-temporal changes in mangrove distribution and fragmentation patterns in the Zhanjiang National Mangrove Forest Nature Reserve, Guangdong province of Southern China, from 1977 through 2010. In addition, a major goal was to assess the socio-economic drivers contributing to the chronic changes taking place within and around the mangrove reserve. Land use and land cover data sets were generated for the reserve for multiple years via unsupervised classification using Landsat time series images. Mangrove fragmentation patterns were then assessed with a fragmentation model. Results revealed that the mangrove spatial extent decreased sharply during the period from 1977 to 1991 due to deforestation caused by diverse development programs, particularly shrimp farming. Afterwards, there was a continuous increase in mangrove extent from 1991 to 2010 due to afforestation and conservation efforts. The mangrove fragmentation trends depicted by the fragmentation model had a high degree of correlation with the observed areal changes. Additionally, the recorded dynamics of the local biodiversity (mainly birds) were consistent with the mangrove ecosystem fragmentation trends over time, and different fragmentation components, including interior, perforated and edge, had distinct impacts on the local mangrove-dependent biodiversity. The most effective way to protect and expand the current mangroves include the following: (1) establishment of mangrove natural reserves, (2) forceful implementation of regulations, (3) establishment of educational programs related to mangrove management, (4) deepening international exchanges and cooperation and (5) increasing the transparency of the project implementation process. Together such management measures will lead towards responsible and sustainable utilization of the mangrove ecosystems.

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