Testing mangrove forest structure development and various forest management options in Gazi (Kenya) by combining KiWi individual-based modelling with >20 years of field data

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Abstract

Recurrent data on mangrove stand development are rare because long-term monitoring data is generally lacking. However, in Gazi (Kenya), several plantations of *Rhizophora mucronata*, *Ceriops tagal*, *Avicennia marina* and *Sonneratia alba* have been established and monitored since 1990. We used KiWi, an individual-based model to hindcast the development of some of these monospecific stands planted at regular intervals, and we used field data on plant development and floristic recruitment under natural conditions to parameterize the KiWi model for each species. Next, starting from the conditions used for planting mangroves in Gazi, we investigated densities and basal areas of planted species as well as the non-planted species that were recruited naturally at different time intervals. We then compared the development of planted forests with or without recruitment and with or without thinning as a forestry approach to management. This study uses a unique combination of field data analyses with simulation experiments in order to demonstrate the mangrove stand development and investigate various forest management options over time. Such information is important for effective mangrove restoration and management.

Keywords

monospecific, restoration, forest management, IBM, ABM, prediction