

Fundamental niche of the trees in mangrove forests

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Understanding the immense complexity of the interacting processes that determine biodiversity, productivity and functioning of mangrove ecosystems still is a major challenge. For this reason, we want to contribute expanding the knowledge about the fundamental niche of species in a mangrove. Our aim is to model the fundamental niche of the main species trees in the mangrove of Gazi Bay, Kenya.

The methodology consists in collecting biotic and abiotic information in the mangrove, integrate it in a Geographical Information System (GIS) and analyse this information in the light of species distribution modelling. In species distribution modelling two sets of input data are required: occurrence data and spatial information on the environmental characteristics of the species habitats. The species distribution modelling techniques are widely used by researchers in rainforests.

All information collected in the field are going to be translated into spatial data using interpolation techniques. We are going to collect information about biotic data (such as: diameter, canopy openness, tree height, basal area, abundance, and taxonomical identification), and abiotic data (such as: soil texture, oxygen level, acidity, nutrient bioavailability, organic matter and salinity). In addition, we are going to incorporate variables like distance from of the major rivers and the sea front.

After the post-processing of the variables they serve as input data for the software Maxent. This program will be used to analyse the potential distribution of the species, in other words, their fundamental niches. In addition, we are going to use the jack-knife technique to analyse which variable will contribute more to the actual distribution of the trees in mangrove.

The expected outcome will be a spatially-explicit outline of the relation of the biotic and abiotic component in the mangrove in regard to the mangrove tree layer and to the mangrove forest in its entirety. It will allow us to describe the fundamental niches of species in the mangrove in terms of abiotic factors as well as other organisms and to deduce hypotheses of interdependence in the system.

Keywords

Mangrove; species distribution modelling; GIS; geoprocessing.