Modeling Tropical Biodiversity and Species Distribution Using Environmental Factors Derived from Global Remote Sensing Data

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Abstract

Conservation of biodiversity on a global scale and particularly in tropical regions requires data sets that can provide information about the geographical distribution of species, environmental factors that define the resilience of ecosystems and species habitats, and processes that create or change the habitats. In this paper, we present the results of a model developed to map the distribution of species in tropical regions based on environmental parameters derived from remote sensing and GIS data. These parameters range from climate conditions such as temperature and rainfall, and landscape and vegetation properties such as elevation, slope, vegetation type, structure, moisture condition, seasonality, and productivity. The model is based on a stochastic decision rule approach that associates probabilities to species presence on a geographical pixel based on the existing specimen data from museums and environmental parameters. The application of the model to tropical regions of south America and central Africa are presented in this paper. The model maps the presence of species on gradients of climate and landscape parameters. These variabilities often coincide with natural factors that provide the environmental stability for existing biological communities and species abundance. Although the model concentrates on the deterministic relationships between habitats and the environment, the renewable parameters from remote sensing data allows the model to incorporate the spatiotemporal hetrogeneities and dynamics as a result of changes in landscape and climate conditions.

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