

Abstract:

Kakamega Forest is the last remaining rainforest in Kenya and the easternmost remnant of the Guinean-Congolian rainforest belt. As such, it is home to a large number of endemic fauna and flora species. Yet the remaining natural forest is under imminent threat of degradation due to a rapidly growing population in its vicinity and a poverty rate far above the national average. The growing demand for forest resources and ecosystem services will continue to exert great pressure on the remaining forest fragments. In this paper, we predict future hotspots of forest clearing of the remaining natural and old-growth secondary forest in Kakamega Forest. We parameterized an artificial neural network model using resilient backpropagation to simulate the likelihood of forest clearing for each location. Input variables into the network included historic information on forest clearings together with variables capturing the status of forest protection, accessibility to roads and markets, as well as topography and forest density. Simulation results were used to predict future clearings based on observed rates of change. Hotspots of forest clearing were derived by assessing the neighborhood density of predicted clearings. Our results indicate that forest clearings occurred across all forest fragments. Hotspots of future forest clearing tended to occur near roads and market centers. Most future hotspots were found in areas with a lower protection status, where some forest use is allowed. But our model also predicted considerable pressure on remaining old-growth forest resources in the strictly protected National Reserve. Our predictions of deforestation hotspots contribute to a better geographic targeting of nature protection activities and forest management investments in Kakamega Forest. Thus, it will hopefully help policy makers and land managers to strike a balance between satisfying the needs of local livelihoods and preserving the unique ecological values of Kakamega Forest for future generations.