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There remains a lack of information on the future of plant species in many parts of Africa under the threads of climate change with the exception of the mountainous areas. Models are valuable tools to examine this problem because they permit to extrapolate basic information as simple as species occurrence coming from a restricted number of localities to the entire continent. Niche-based models, like logistic regression or MaxEnt, easily allow fitting empirical relationships between environmental variables related to species existence and possibly to soil properties. They produce probabilities of occurrence for the present with good accuracy (calibration phase). Projections for the future are made by switching the explanatory data set with future conditions. These models however are limited by the fact that it is difficult to integrate physiological response to increasing CO2 air concentration.

Dynamic vegetation models (DVMs) are process-based models that simulate plant environment (soil water, light intensity at various heights, etc.) and plant physiology (transpiration, CO2 fixation, photosynthesis, respiration, carbon allocation, etc.) from climate variables, soil properties, and elevation. They could be run at various scales, from global to regional or even local scale, and simulate the growth of plant functional types (PFTs), of biological affinity groups (BAGs) or of species. A model like CARAIB is able to simulate PFTs and BAGs growth (occurrence and productivity) with rather good accuracy for Western Europe. For the future, the simulations confirm that the physiological effect of CO2 concentration change is dramatic but not easily foreseeable because it depends on overall fertility of the sites (Dury et al., 2011). From this conclusion, spatial and temporal variations of fertility would have to be introduced in modelling studies to reach more operational conclusions.

Questions arising about the future of ecosystem services in tropical countries highlight particular plant species (BIOSERF project funded by the Belgian Science Policy: Sustainability of tropical forest biodiversity and services under climate and human pressure). In this study, we model a set of 11 selected African tree species including several Congolese species with logistic regression, MaxEnt and CARAIB models. The two niche-based models rather properly simulate the ranges obtained with the alpha-hull polygon method. CARAIB correctly simulates the range of the evergreen species but not of the deciduous trees. We examine how physiological knowledge could be used to improve the model. In particular, we conclude that bud dormancy breaking representation has to be upgraded in the model because this process is likely to control the range of the species. It should act in combination with the specific bioclimatic constants controlling the hydrological and thermal stress and the germination. Additionally, we examine the evolution of the ranges at the 2050 horizon using one of the most recent socio-economic scenarios.

MODELLING SEED DISPERSAL AND TROPICAL FOREST REGENERATION: AN APPLICATION TO STAUDTIA KAMERUNENSIS IN THE WWF LAKE TELE - LAKE TUMBA LANDSCAPE IN RD CONGO

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1. Protecting Forest Resources
The life of millions of people in Africa depends on the rainforest found in different parts of the continent. The African Union Commission (AUC) and all Africans jointed and severely protect rainforest resources in Africa by

1.1. Reducing the rate of forest degradation and loss of bio-diversity through protected area management, promoting involvement of the community in forest conservation and development on the basis of benefits sharing with the community. Avoid exclusion of local communities from forest management activities.

1.2. Allocation of the continent’s forest resources in to protected forest areas, production of forests and manage according to management plan.

1.3. Achieving sustainable use of forest by the local inhabitants and protect them from natural and man made calamities.

1.4. Encouraging joint forest management, intensifying forest conservation in highlands, lowlands and pastoralist area and improve forest policies.

1.5. Supporting a network of effectively managed protected areas and promotes women’s participation in forest conservation.

1.6. Organized major logging companies to improve forest management practices.

2. Conserving Forests
Most of Africans’ rural and urban poor people depend for their livelihoods almost entirely on natural resources specifically on forests. The AUC and other stakeholders have a duty to conserve forests in Africa and in surroundings by

2.1. Addressing the links between forests and urban-rural poverty alleviation in Africa by developing alternative business plans that create revenue.