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TROPICAL ECOLOGY | 2018

ANNUAL MEETING OF THE SOCIETY FOR TROPICAL ECOLOGY (GTÖ)



**CHALLENGES IN
TROPICAL ECOLOGY AND CONSERVATION -
GLOBAL PERSPECTIVES**





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FUNCTIONAL SHIFTS WITHIN CENTRAL AFRICAN RAINFORESTS

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Understanding the reaction of ecosystems to climate change and anthropogenic pressure is a central question in ecology and environmental sciences. In the terrestrial tropics, theoretical and empirical works suggest that once external disturbances have reached a given threshold, forest-savanna systems can switch from one state to another. Considering the multiplicity of the tropical forest systems, we make the assumption that numerous shifts may actually occur within the forest itself, without changes in forest cover but with risks of critical modifications in forest functioning.



To test this hypothesis, we used a finite mixture of regression models aiming at simultaneously predicting and grouping forest functional profiles at the stand level with respect to anthropogenic pressure, climate and soil. The model is built on a dataset of more than 140 000 plots of 0.5-ha each gathered from Central African forest companies. Forest stand functions are analyzed through two key functional traits: the successional status - pioneer vs. non-pioneer trees- and the leaf phenology - evergreen vs. deciduous trees.

Our model captured a significant part of variation in the functional composition over the study area and revealed how anthropogenic pressure, climate change, soils or their combination lead to profound modifications within the forests. In particular, we showed that shifts from evergreen to deciduous stands can be mediated both by anthropogenic pressure or climate change.

This work shows for the first time how external forcing may jointly lead to multiple shifts in the functional composition of tropical forests. Our model allowed to predict directional changes in forest functioning according to anthropogenic pressure and climate thus opening new perspectives in theoretical ecology, global vegetation modelling and in the understanding of the vulnerability of tropical forests to global changes.

