

<p>ISEI 7 7th International Conference on Ecological Informatics 13 – 16 December 2010</p> <p>Ghent University Ghent, Belgium</p>	<p>Bird communities in the transition Amazon – Cerrado, Brazil: a qualitative model to predict the richness of trophic guilds according to the structure of vegetation.</p> <p>R. de Souza Yabe, P. Salles & G.F.M. Leite</p> <p>regyabe@hotmail.com, psalles@unb.br, gfmleite@gmail.com Institute of Biological Sciences, University of Brasilia Campus Darcy Ribeiro, Brasilia, 70.910-900, Brazil</p>
---	--

Session: Qualitative reasoning (Chair: B. Bredeweg (The Netherlands))

Timing: 14 December 2010, *Blancquaert room*, 16h00-16h20 (Code QR 12)

Abstract

Ecotones present an ideal setting for studying mechanisms of community structure that may cause changes to biodiversity patterns and evolutionary processes. For example, aspects of vegetation structure related to the availability of habitat and resources for a given guild may determine the occurrence and abundance of specific bird species. In spite of their importance, the areas of contact between the Amazonian forest and the Cerrado biome in Central Brazil are among the most critically endangered and neglected area of vegetation in the Amazon biome.

Qualitative reasoning models can be of some help to elucidate ecological processes in the transition range, by expressing incomplete knowledge about key factors held responsible for changes in the system and the consequences of their variation in time and space. The qualitative model developed in this study explores the structure of bird community in the transition zone, determining in which region a trophic guild should have greater richness or more abundant populations, depending on the variation in vegetation structure of riparian forest along the transition between the Amazon and Cerrado biomes.

In this model, rainfall starts changes in the system, through a positive influence on water availability in the soil. In the one hand, soil moisture is higher in the Amazon than in the Cerrado, a factor that contributes to changes in the vegetation structure, resulting in a tall forest with closed canopy and homogeneous profile of vegetation, with large amount of biomass in the form of litter accumulated in the soil surface. These conditions affect the richness and abundance of some bird guilds. Among such guilds, the canopy and soil frugivores, canopy generalists, understory insectivores living in dead leaves, terrestrial insectivores and antbirds should be favored by the vegetation structure typical of the Amazon region. The greater abundance of canopy generalist and frugivore birds, acting as seed dispersers, in turn will contribute to the population growth rate of trees, which fruits are part of their diet, creating a major abundance of tree vegetation in the Amazon region via a positive feedback.

On the other hand, the model shows that in the Cerrado, where soil moisture and ground water availability are lower. In this case, the riparian forest profile tends to be lower and heterogeneous with more open canopy, allowing more light to penetrate onto the soil, a condition that favors the growth of an understory vegetation consisting mainly of shrubs. These conditions are more favorable for green foliage understory insectivorous guilds and understory generalists. Generalist species, being seed dispersers will contribute to the population growth rate of shrubs, providing the increase in the abundance of shrubs completing the cycle.

The model follows the ontology provided by the Qualitative Process Theory and was implemented in the learning environment DynaLearn, a workbench for qualitative modeling and simulation, according to the compositional modeling approach, in which different simulation models can be composed by the combination of quasi-independent fragments of models. Intended use of the model is to provide support for undergraduate and secondary school students to understand the complex interactions between biophysical factors among biotic communities in tropical forests. Ongoing work includes an evaluation with experts and preparation of pedagogical materials to be tested with students.

This work is co-funded by the EC within FP7, Project no. 231526. For further information, visit <http://www.DynaLearn.eu> R.S.Y is grateful to the Brazilian agency CAPES for her doctoral scholarship.