Forestry potential, under the REDD + mechanism in Tocantins State, threatened by agricultural and livestock expansion

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Cerrado conservation is essential to the maintenance a number of species and ecosystem services (ESS), as it holds 30% of national biodiversity. Considering REDD+ mechanisms facilitate forest conservation and prevent climate change, these mechanisms contribute to the maintenance of ESS. The Tocantins state is into nowadays area of expansion agriculture and livestock in Brazil, however, the total of production is not completely destinate to population consumption. The objective of this work was to relate areas with potential for REDD + and their use for the generation of calory for human consumption through agricultural production. Based on SICAR data of limits of properties and land use/cover of MapBiomas we performed spatial analyses to retrieve relationships between agricultural and forested areas. Agricultural Census data (IBGE) will allow the estimation of available calory from regional agricultural production. The analysis resulted in approximately 484,16 Mha of forested areas prone for REDD+ at the property level in Tocantins. Despite agricultural expansion in the Cerrado it's based on high technological improvements, part of this production is not consumed directly by the population, where almost 20% of soybean production goes to national livestock feeding linked to increasing meat consumption by population. That is food habits of Brazilian population is also contributing to land pressure over forests, but not improving nutrients intake. So REDD+ mechanisms policies must be considered together with more sustainable food education habits.

B7a: MONITORING AND MODELLING OF FOREST HEALTH IN A CHANGING WORLD

How accurate are the predictions made by ecological modelling? A case study of the eucalypt pest *Glycaspis brimblecombei* (Hemiptera) around the world

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The red gum lerp psyllid Glycaspis brimblecombei Moore (Psylloidea: Aphalaridae), originating from Southeast Australia, is a major pest in eucalypt plantations around the world. In a study published in 2012 the potential distribution was estimated using ecological modelling based on the occurrence of the species in Australia, the Americas (eight countries), Mauritius, Italy, Portugal and Spain. The study predicted that temperate areas are more favourable for the occurrence of Glycaspis brimblecombei than tropical ones. Since the publication of the study, the red gum lerp psyllid spread all around the Mediterranean Basin (Africa: three countries; Asia: two countries; Europe: five countries) and invaded southern Africa (four countries). The envelope score model that seemed very pessimistic at the time turned out to be quite realistic. According to the canonical analysis, the pest *G. brimblecombei* is very plastic, adapting easily to newly colonised areas. We conclude that ecological modelling provides reliable predictions and, hence, is a useful tool for managing eucalypt plantations.

Ecological niche modeling of *Araucaria angustifolia*

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Ecological niche modeling (ENM) has been used to estimate current, past, and future geographic distributions, based on the correlation of observed species occurrences and environmental variables. Such estimates can be used in ecology to predict geographic changes in species occurrences, and give support to decisions towards conservation of biodiversity. Species of the genus Araucaria are mostly endemic and restricted to areas with temperate climate. In Brazil *Araucaria angustifolia* is the only representative of the genus, with great ecological importance in the Atlantic forest, characterinzing an entire forest ecosystem. Currently the species is in danger of extinction, yet only few attempts have been made to estimate potential effects climate change to its distribution. In this study we aim to assess spatio-temporal changes in the distribution of *Araucaria angustifolia* with regard to current, past and future climatic scenarios. We obtained occurrences and climatic layers for different scenarios on digital databases and used Maxent to calibrate models and project to different scenarios. Our results indicate that the overall trend for future climate change scenarios is retraction of the geographic distribution, however the intensity of changes depends on the future scenario. The species may experience expansion to some areas, indicating the variability of local responses. Conservation and restoration actions need to consider potential effects of climate change for effective use of limited resources, ENM has been shown to give support to decision making with regard to estimating geographical distribution of endemic and endangered species such as *Araucaria angustifolia.*

Do ozone and drought change the parameters of photosynthesis-stomatal model? The analysis by the optimal stomatal conductance model

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The exchange of gases, as well as water vapor, between interior of leaves and the atmosphere are regulated by stomatal pores, termed stomatal conductance (gs). Semi-empirical photosynthesis-stomatal models (e.g., Ball-Woodrow-Berry model) are widely used in many land-surface schemes in climate model. These model need two important parameters, 1) the slope of the conductance-photosynthesis relationship, 2) the y-intercept of this relationship (gmin, minimum conductance). In Mediterranean region, trees are often suffered from ozone (O3) and drought stress in summer. Both O3 and drought are known to affect gs. Therefore we investigated whether O3 would change the parameters of the photosynthesis-stomatal model in Mediterranean trees (Phillyrea angustifolia, Quercus ilex, *Q. pubescens*, *Q. robur*) grown under O3 FACE (Free-Air Controlled Exposure) experiment. To discuss the effect of O3 on gs, we applied the optimal photosynthesis-stomatal model involving water, CO_2 and O3 flux using gas exchange data. This analytical model was proposed based on the optimization theory of gs for maximizing carbon gain while minimizing accompanying water loss and O3 influx.The optimization theory suggests that O3-induced stomatal closure in early summer may reduce O3 influx, and allow maximum photosynthetic capacity to be reached. However, in late summer, the theory did not explain the effects of O3 on gsin *Q. robur*, showing an increase of gmin under elevated O3. This may relate to the loss of closing response of stomata by O3 (i.e., stomatal sluggishness).