PARTITIONING β - DIVERSITY IN A TRANSITIONAL AREA OF SOUTHERN BRAZILIAN ATLANTIC FOREST

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INTRODUCTION

The pioneer ecology research in diversity indices has began in the sixty decade when Whitakker (1960,1972) defined the β-diversity as a variation of species composition among sites in a geographic location. Since that propose, different indices of β-diversity have been created and measured. See Wilson and Shmida (1984), and Legendre *et al.*, (2005).

In southern Brazilian Atlantic domain there are transitional areas reflecting high indices of vegetal richness and species diversity (Jarenkow & Budke, 2008). More precisely, in northern Rio Grande do Sul state we find a transitional area among semi - deciduous and Araucaria mixed forests (Leyser et. al, 2008).

Since Rambo (1951, 1956, 1961) the vegetation physiognomies and classification patterns of Rio Grande do Sul state has been research target. Although, are necessary more specific published studies who contains an actually scenario of the pattern and progress of a environmental degradation, and a relationship between the climatic changes and agricultural expansion.

The tree flora of southern Brazilian Atlantic forests has been investigated according to a variations in floristic composition of rain (Araucaria mixed forests) and semi - deciduous forests and analyzed in terms of geographic and climatic variables including temperature and rainfall regime (Oliveira - Filho *et al.*, 006).

Legendre *et al.*, (2005) considered studies in diversity indices as a key for a functional understanding of ecosystem, creating knowledge about conservation and environmental management. The essence in diversity indices research is the search for ecological answers, and a necessity to understanding how environmental gradients are responsible for patterns of geographical vegetal distribution, and what natural variables are more correlated with β-diversity indices.

Plants require solar radiation for photosynthesis and their growth is proportional to the amount received. And we supposed that other environmental variables are not limiting factor. In Jacovides (2007) we find that the portion of the solar spectrum used by plant biochemical processes in photosynthesis (conversion of light energy into (biomass), extends from 400 to 700 nm. These wavelength limits define the so - called photosynthetically active radiation.

OBJECTIVES

To find a role of diversity patterns we use, in the present study, radiation indices, obtained from NOAA database and a digital elevation model, obtained by software Idrisi (Eastman, 2004). After, studied areas were compared according to the amount of solar radiation received. This paper questions whether the amount of radiation that a specific area receives during the year can be correlated with patterns of β-diversity found in the studied geographic area.

MATERIAL AND METHODS

Study area

The study was accomplished in Alto Uruguai region, on the north of Rio Grande do Sul, more accurate in the city of Faxinalzinho (S 27º 20' 40.5"; 27º 26' 36" e W 52º 40' 32.2"; 52º 44' 38"). There, we can find natural areas without direct human impact. Although intensives agricultural pressure some areas are still in conservation, keeping intact the natural vegetation structure. The climate is classified, using Köppen model, as Cfa, with annual rainfall and mean temperature of a coldest month is approximately 18º (Moreno, 1961).

Procedures

For a better estimative of a structure parameter, a method of plots (Mueller - Dombois & Ellenberg, 1974) was adopted. A total of 50 plots (10 m x 10 m) were sampled along the

solar radiation gradient. Was measured the entire live tree with PBH more than 15 cm.
Were calculated phytosociological parameter of richness (S), density, and IV, using FITOPAC (Shepherd, 1995). To calculate the amount of solar radiation that covering the area we used software NOOA Solar position calculator. Using geographical coordinates of study area we can find the total of direct and diffuse radiation covering the land surface during a certain period of time.
After, the plots and matrix tree were correlated and diversities indices was calculated using the Shannon index (H), Pielou equability (J), Jaccard similarity a/(a+b+c), and β-diversity index using Whitakker β = (c/a) - 1 (1960) and Wilson and Shmida β = (b+c) / 2a+b+c (1984).
To measurement β-diversity among the plots they are rated with letter A to E. Where the first plots are shaded than last plots

RESULTS AND DISCUSSION

Whereas the study area as a transitional contact area among semi - deciduous and Araucaria mixed forests (Leyser et. al, 2008), and a disposal of plots is made at different levels of topography and consequent exposure to solar radiation the diversity indices founded can be considerate high, for studies in sub - tropical Atlantic forest.
The richness (S) was 86 species that encompassed 38 botanical families. 605 living trees were measured. Casearia silvestris Sw. as 54 individuals and Nectandra lanceolata Nees as VI 21.27 have highlighted in the sample. Araucaria angustifolia (Bertol.) Kuntze, three that characterize a phytographical region had only eight sampled individual. Gymnanthes concolor Spreng. showed 27 sampled individual, mostly in the more shaded areas. Species diversity (H') was estimated as 3.88 nats ind. - 1 and equability (J') was 0.87.
A variation of direct solar radiations covering the land surface of Alto Uruguai region in a year varies from 1089 kw in June to 1892 kw in December.
The highest Wilson and Shmida's (1984) β-diversity were between A and E (0,78). Whittaker's (1960) highest β-diversity indices among samples were A and B (0,82). Highest Jaccard similarity indices were between A and D (0, 45). Cluster analysis of sampled area identified five groups in randomization tests. That result and similarity tests confirm significant difference among sites.
Given the small number of studies β-diversity indices among distinct areas can't be compared whit other studies, but Shannon index (H') value found is considered high for sub - tropical Mixed Araucaria forests. Generaly, this variation is from 2,247 to 3,53 (nats), also floristic heterogeneity located in close areas shows differences among transitional areas when compared a mixed Araucaria forests strictu sensu. (Jarenkow and Budke, 2008).
After analyses we considered a forest fragment founded in Faxinalzinho as refugees "still" untouched of Rio Grande do Sul original's vegetation. However, most conserved areas founded in places of difficult access, that information can be related to dissimilarity indices found among plots with steep slope.
The amount of direct and diffuse radiation can be correlated to differences in a forest structure, but, other environmental variables, as topography, soil components, slope, proximity to water appeal and anthropic actions can't be forgotten. The climatic characters explain global differences in vegetation, soil characteristic are responsible for local patterns of spatial distribution.

CONCLUSION

Our study showed that higher β - diversity occurred along the entire area, reflecting both abiotic and biological changes over space. Due to high radiation changes in this area, we suggest that this variable increases β - diversity and in this case, such area present potential environmental for regeneration, then reflecting the efforts for conservation.

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