Geoprocessing applied to the phytosociological survey in permanent plots

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Abstract

The goal with this work was to create a georeferenced data bank to follow the phytosociological changes of types of trees along the time and its geographic distribution in the field of study. To the phytosociological survey permanent parcels were plotted in the field of study along the floodplain of the rivers Carro Quebrado and Cascavel, both located in the Campus of the Universidade Estadual do Centro Oeste (UNICENTRO – CEDETEG), in Guarapuava city, Parana state. In each part the attributes analyzed were: sociologic position (SP); class of crown (CC); characteristics of trees (CT); quality conditions of the trunk (QCT); conditions (Cs). These parts were put into spaces with use of the Global Positioning System (GPS) and the data were sent to the SPRING software with the intention to build a cadastral data bank to follow and analyze the development of the local vegetation. The creation of this data bank allowed following the development of trees in a time scale, showing the evolution of the part of the forest studied.

Key words: data bank, System of geographic information, Alluvial mixed araucaria Forest

Introduction

In Parana state, due to its geographic position, there are many climatic zones that result in distinctive types of vegetation (RODERJAN et al., 2001). In Guarapuava city it is possible to find a landscape composed by the association of clean field (Woody-grass Steppe), clumps of trees and gallery forests associated to Araucaria forests (mixed araucaria Forest) (MAACK, 1981). To Behling and Pillar (2006) this is a characteristic of the South of Brazil, where is possible to find a mosaic composed by fields and Araucaria Forests.

Associated with fields, composing forest corridors along the rivers, or composed by riversides from the Araucaria forests, the Alluvial mixed araucaria Forest (ZILLER, 2000; RODERJAN et al., 2001) presents distinguitive characteristics of vegetation in the environment, due to its proximity of water bodies, and, therefore, because of this big amount of water, they usually develop over the floodplain of rivers.

In this context, this formation of forest becomes important because, it is related to the protection in terms of managment, related to siltation and also a regular element in terms to supply the water courses.

The formation and evolution of alluvial plains, is directly related with hydro-geomorphological factors combined together, that are not completed acknowledge. There is an idea of the importance of some important determinant factors, such as topography, the dynamic of mechanisms of transport and deposition by rivers, the different intensities of floods and the capacity of infiltration and the power of conducting the water from soils, including those from hills that surround them, among others (GURNELL, 1997).

In the alluvial plains appear some sutil microtopography variations, that determinate many microenvironments, relatively close to each other, frequently associated to the differences of distribution and development of species and vegetal communities, with a reflex of characteristics, in many cases they are restrictive, inherent to this environment (TRICART, 1968; VIVIAN-SMITH, 1997).

The Alluvial mixed araucaria Forest from Cascavelzinho river and its afluents, even being considereted as areas of permanent preservation, are being modiefied by different economic activites, in some cases, causing irreparable losts of biodeservitiy, ecological functions and environmental services that these ecosystems provide to society.

In that matter, the demand for information about these riparian systems is growing and there is a need to recover the degraded environments from riparian forests, their functions and ecologic processes. However, there is little information about the choice of species and the combination among them.

To Socher et al. (2008) there is an important need of studies to preserve and recover riparian environments, contributing to improve the quality of life of all population, enlarging the life cycle of springs of supplied water and power houses providing then with economic, social and environmental benefits, which means, reaching the goals of sustainability that are so worldwide disseminated.

In that sense, the following article comes to develop, with techniques of geoprocessing – which consists on " ... a group of enter, manipulation, storage and data analyze procedures spatially referenced (TEIXEIRA and CHRISTOFOLETTI, 1997, p. 121)- a bank of data that is georeferenced from a data given by a phytosociological survey in the area of Alluvial mixed Araucaria Forest.

Materials and methods

This project was developed in the Campus of Univerdade Estadual do Centro Oeste (UNICENTRO – CEDETEG), in Guarapuava city, Parana state. The area studied is located on the third tableland from Parana state at approximately 1020 meters high and it corresponds to the reinmaing Alluvial mixed araucaria Forest. It is located among these coordinates 25º 23' 00" S – 51º 30' 00" W e 25º 22' 47" S – 51º 29' 43" W according to figure 1.

According to Maack (1981), Guarapuava is located in a warm temperate zone, subtropical cool to cold in winter. According to the Climate letters of the State of Parana (IAPAR, 2000), the city is under the influence of a temperate humid climate type, according to the Köppen climate classification, which is: C = mesothermic Wet Climate, and the average air temperature of the three coldest months are between -3 º C and 18 ˚ C. f = always humid, without dry season; b = mild summer, where the average temperature of the warmest month is below 22 º C, but at least four months have temperature higher than 10˚ C.

To collect the data of this studied area, it was first demarcated six permanent plots with dimension of 10 x 50 m, and those plots were divided into 5 sub-plots with 10 x 10 m along the flood plains of the rivers Carro Quebrado and Cascavel.

Inside each plot was measure all the trees types, considering some characteristics such as: sociologic position (SP); tree top class (TTC); tree characteristics (TC); condition of quality of trunk (CQT); health conditions (HC) to qualify and quantify the tree composition of a fragment of Alluvial mixed araucaria Forest.

Those plots were plotted with the use of Global Positioning System (GPS) allowing locating the tree types in portions. These data were transferred to a file from the software TRACK MAKE© and migrated as dots to the software AutoCad 2000 MAP©. After that, the data were sent as DXF-R12 to software SPRING3 (system of Processing georeferentiated information) setting a goal to build a cadastrual data bank that would follow and analyze the development of the local vegetation.

Once the insertion of all types of trees from this portion was completed, the information can be consulted, through generation and selection of objects collection (Figure 2). It is possible to relate two or more adjuncts that were previously defined through a logical expression defined by user. Showing as an example, the access into the data bank to locate individuals of the specie Miguel Pintado (*Matayba elaeagnoides*), with a sociologic position equal to two. To this, it was created a collection, inserting a logical expression (Figure 2), followed by the commands "generate" and "apply". After executing these commands, it will arise a window that will show a chart, with all the types of trees that fit into these characteristics (Figure 3), visualizing a special distribution of types of trees in the plots (Figure 4).

Results and discussions

The following project had as results spatialization of all the types of trees in the permanent plots and the creation of a spatial georreferenciated data bank to search and visualization of trees on a temporal scale, showing the evolution of this fragment of the forest.

The generation of a data bank that is cadastral-object, allows the most variable forms of use and application, moreover, is a primordial tool to quick answers, such as: where can you find the pines (*Araucaria angustifolia*)? Where can you find

Figure 1. Map of the location of the studied area and from the georeferenced permanent plot.

the individual with a sociologic position of two? Therefore, this kind of work is very important in forest management, because the survey data in different periods allows comparing through the use of geoprocessing, the evolution, generation and characteristics of permanent agents of each plots, through the consult of phitosiologic parameters.

Conclusion

It is possible to conclude that the System of Zographic Information, especially the SPRING *software* through the creation of a data bank that will aid on complementary works and will follow the development of types of trees left along the years, besides their importance in phytosociological surveys and the forest composition.

Figure 2. Screen of generation and selection of collection

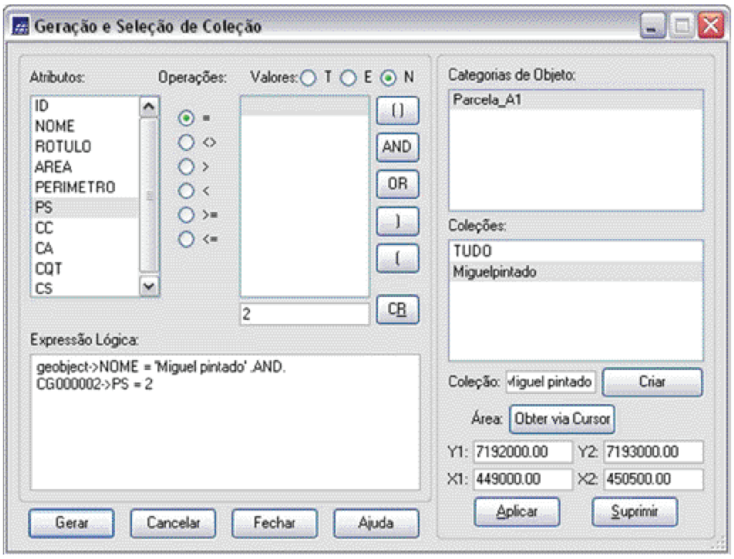


Figure 3. Chart that presents the collection of information it was given.

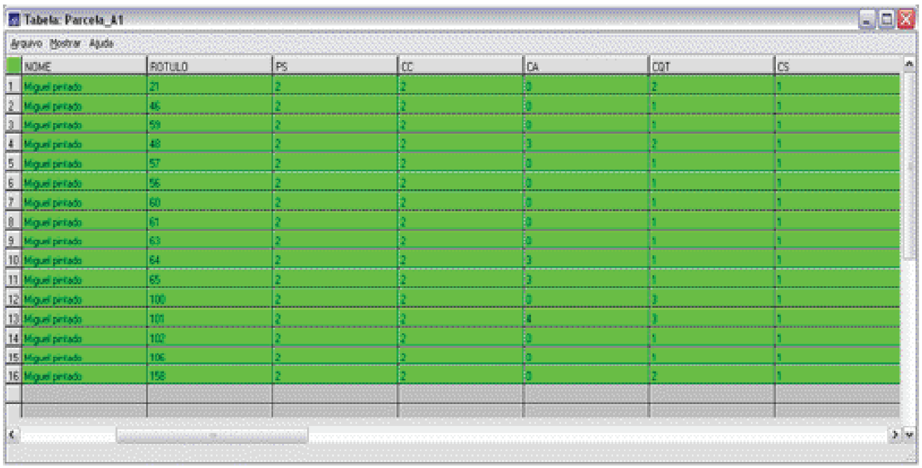
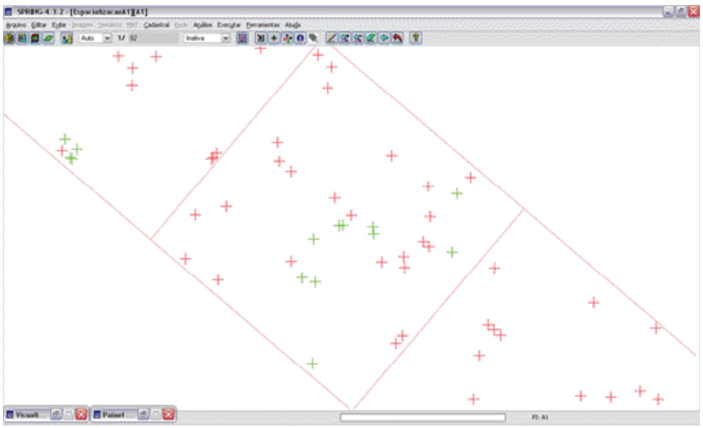


Tabela: Parcela_A1

Arquivo Mostrar Ajuda

	NOME	ROTULO	PS	CC	CA	CQT	CS
1	Miguel pintado	21	2	2	0	2	1
2	Miguel pintado	46	2	2	0	1	1
3	Miguel pintado	59	2	2	0	1	1
4	Miguel pintado	48	2	2	3	2	1
5	Miguel pintado	57	2	2	0	1	1
6	Miguel pintado	56	2	2	0	1	1
7	Miguel pintado	60	2	2	0	1	1
8	Miguel pintado	61	2	2	0	1	1
9	Miguel pintado	63	2	2	0	1	1
10	Miguel pintado	64	2	2	3	1	1
11	Miguel pintado	65	2	2	3	1	1
12	Miguel pintado	100	2	2	0	3	1
13	Miguel pintado	101	2	2	4	3	1
14	Miguel pintado	102	2	2	0	1	1
15	Miguel pintado	106	2	2	0	1	1
16	Miguel pintado	158	2	2	0	2	1

Figure 4. Location of individuals demonstrated in the chart (green crosses) and others (red crosses)



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