

Spatial Analysis of Forest Fragmentation Using Language R

Rudiney Pereira and Juliana Marchesan (Brazil)

Key words: Geoinformation/GI; Land distribution; Land management; Remote sensing; Spatial planning; Landscape ecology metrics; Forest remnants; Software R; Remote sensing; RapidEye

SUMMARY

There are decades the deforestation resulting from the process of anthropization of the landscape has been causing the destruction of natural resources. The native forests are giving space mainly for agriculture, cattle raising and urbanization, occurring the formation of fragments. The process of forest fragmentation is present in the different biomes, standing out the Atlantic Forest biome, due to its high degree of deforestation.

In this context, several landscape ecology metrics have been used to analyze forest fragmentation by means of software. Recently, researchers have been using R software to analyze spatial data, however, the use of the same to calculate landscape metrics is incipient. In this context, the present study aims to develop an R language package for the calculation of landscape ecology metrics, as well as, to use the same for the analysis of the forest fragments, under the domain of the Atlantic Forest biome, located in the hydrographic sub-basin of Arroio Jaquirana, Rio Grande do Sul, for the year 2016. For the development of the package, called LanscapeMetrics, used the R software and packages igraph, raster, rgdal, rgeos, devtools, roxygen2 and Rtools. In order to avoid the use of redundant metrics a total of twenty-one was selected covering metrics of area and density, shape, border, central area and proximity. For the mapping of the forest fragments, used images of the RapidEye/REIS satellite dated 02/29/2016,

with the definition of two classes of land use and cover: native forest and other uses.

The classification was supervised through the Bhattacharyya algorithm, using SPRING software. The fragments were analyzed separately in size classes, to separate them used the software R. The results showed that the native forest occupied 14,099.89 ha, corresponding to 34.01% of the study area, covering a total of 1,995 fragments, of which 93.43% less than 5 ha. In the size class occupied

by the fragments smaller than 5 ha, it was found a higher edge value and a perimeter-area ratio, indicating a greater edge effect, so that the central areas of these remnants are exposed to the effects of the external matrix. This fact is proved by the calculation of the metrics of central areas, since, subject to the edge distances from 80 m, total domination by the edge effect occurs. However, these smaller fragments are important, since they lessen the distance between the larger fragments, due to their high density and being well distributed in the study area. Thus, it is concluded that software R is a promising and efficient tool for spatial data analysis, which allowed the manipulation of data from remote sensors.