

Evolution of spatial correlation of mean diameter : a case study of trees in natural dipterocarp forest.

ABSTRACT

Problem statement: Spatial modeling has many applications in various fields like agriculture, meteorology, forestry and it takes into consideration the spatial correlation structures. In the field of forestry the growth rate, in particular, the diameter of trees is usually an important parameter. The growth rate of trees in a forest is likely to be influenced by various factors like nutrients, fertility of soil, sunshine and rainfall. In this study, we investigated the spatial correlation of the mean diameter of trees in the natural Dipterocarp forest in Gunung Tebu forest reserve, Terengganu, Malaysia. Approach: The diameters were measured using the diameter tape and the unit of measurement is in centimeters (cm). The main sampling unit was 1 ha plot of 100 by 100 m located approximately in the centre of each treatment block. Within the 1 ha sample plot, the quadrants (20 by 20 m) were numbered consecutively from 1-25 and in the outer 16 quadrants; all trees having a diameter at breast height over bark (dbh) of 15.0 cm or more are individually numbered, tagged and enumerated. Using the rook's and queen's neighborhood structure, we computed the Moran's spatial correlation coefficient for the mean diameter of trees in each quadrant for the years 1975 up to 1986. Results: We found that there was a negative spatial correlation among the mean diameter of trees in the 16 quadrants (cases) of the natural Dipterocarp forest in Gunung Tebu forest reserve, Terengganu at \hat{I} level 0.10. Conclusion/Recommendations: The existence of negative spatial correlation indicated that there was competition among the trees in Dipterocarp forest as a result of tree growth over time which was affected by species, size, age and other environmental factors. Further research will concentrate on the spatial modeling of diameter of trees for the years where negative correlation was found.

Keyword: Spatial correlation; Moran's correlation coefficient; Queen's and rook's structure.