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Determination of the relationships between shannon diversity values in different spatial scales derived from satellite data and five wild mammals: A case study of Ağlasun (Burdur) District, Turkey

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Abstract: Topography and vegetation are the most important factors affecting distribution of wildlife species. Although topography changes in any area can take place many years, vegetation changes can be seen even in short time intervals, such as seasonal changes. For this reason, it is important to determine and know the habitats related to vegetation that wild animals prefer. Determination of vegetation changes by traditional field measurement methods is time consuming and costly process. The use of satellite data providing continuous data for over large areas in the detection of vegetation changes will be beneficial in terms of time and cost. This study was carried out on 50 sample areas in Burdur-Aglasun district using indirect inventory techniques. As a result of study, sign and tracks of five different wild mammals (*Sus scrofa*, *Vulpes vulpes*, *Meles meles, Lepus europaeus*, *Martes foina*,) were recorded. The relationships between presence-absence datas of these species and Normalized Difference Vegetation Index (NDVI) and Soil Adjusted Vegetation Index (SAVI) ratio images derived from Landsat-8 OLI (resolution: 30 m) satellite data were investigated. With the Definiens Developer software, multiresolution segmentation was performed and the satellite data were separated into different patches considering color values. Then, the study area was divided into squares with 80, 40, 30, 20, 15, 10 and 5 pixels in different spatial scales. Shannon diversity index (SDI) values were calculated for each cell taking into account the patches within each cell in these spatial scales. The relationships between the SDI calculated at different spatial scales belonging to each sample area and the presence-absence data of wild mammals were analyzed by classification and regression tree (CART) technique. NDVI with 4 species and SAVI with 1 species were found to be associated. As a result of the analysis, it was determined that the different spatial scales of NDVI image were related to be Wild boar (30 pixels), Red fox (30 pixels), Badger (20 pixels), European hare(80 pixels) and SAVI image was related to be with Beech marten(5 pixels). The training and test values obtained with CART technique were recorded as 0.89-0.84, 0.80-0.70, 0.84-0.73, 0.71-0.67 and 0.80-0.68, respectively. Spatial distributions of plants have a low SDI value due to the limited number of different patches entering into small scales, while this value and complexity increases at large scales. When it examined demands of wild animals according to patch diversity in study, the following results were obtained. While Wild boar (SDI>1.99), Red fox (SDI>2.41), Beech marten (SDI>0.59) and European hare (SDI>3.8) prefer areas with high diversity, Badger (SDI<1.82) prefer low-diversity areas. The results show that satellite data can be used to estimate distribution of wildlife species. If future studies carry out in a larger area, in different seasons and with more sample areas, potential of use of satellite data will become clearer in terms of wildlife.

Keywords: Classification and regression tree, Satellite data, Shannon diversity index, Wildlife