



Monitoring the Mediterranean type forests and land-use/cover changes using appropriate landscape metrics and hybrid classification approach in Eastern Mediterranean of Turkey

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Received: 14 October 2019 / Accepted: 11 October 2020
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Abstract

Monitoring the Land-Use/Cover Change (LUCC) is an important tool to evaluate the reasons for environmental changes in ecologically sensitive landscapes like natural forestlands. Rural landscapes are of vital importance for ecosystem productivity, ecosystem services, and biological diversity to continue sustainably. The purpose of this paper was to detect LUCC and its effects on landscape ecology through landscape metrics in the Eastern Mediterranean of Turkey. In this study, a hybrid classification approach was used to classify the Land-Use/Cover (LUC) and detailed forest tree diversity considering topography, plant density, and satellite waveband reflectance values. To this extent, detailed LUC classification, LUCC analyses from 2003 to 2014, habitat quality differences by generating landscape metrics in two levels are called landscape and class-level metrics were carried out in the study area. Habitat quality evaluation on forest formation scale using a hybrid classification approach provided a great advantage and made it possible to examine the landscape metrics of the plant types within the scope of temporal change. The study method was implemented in seven stages including: (1) classification of forest–no forestlands with the K-Means algorithm, (2) creating a data set of reflected signals over stand types, (3) determining the rules and thresholds of decision tree algorithm, (4) object-based classification of agricultural, rocky, and settlement areas, (5) obtaining the land-cover maps for 2003 and 2014, (6) post-classification change detection analyses, and (7) assessing the habitat quality via landscape metrics. The results indicated that forest areas increased by 10.73%, while bare soil decreased by 17.70% in 12 years. The habitat quality increased in the same period in the study area according to the results of class area, mean shape index, mean patch size index, edge density, patch number, and Shannon's diversity index values.

Keywords Land use/cover · Forest-type classification · Change detection · Landscape metrics

Introduction

Land-Use/Cover (LUC) maps are used to be an indispensable indicator for monitoring, evaluating, and managing the areas in the landscape scale because of increasing population and intense human pressure. LUC can be subjected to an anthropogenic change, which is caused by deterioration

of ecosystem processes. This breakdown of ecosystem processes results in a loss of performance of ecosystem goods and services (Tripathi et al. 2019). Ecosystem goods and services are contributed to human life. These services included provisioning, regulating, supportive, and cultural services, directly affecting the people (MEA 2003). The flux of energy and materials, which are from one pool or quantity to another, took place through key ecosystem processes (Diaz-Varele et al. 2009). Therefore, monitoring, evaluating, and management processing of rural landscapes within the scope of landscape ecology are contributed greatly to humans in terms of ecosystem services. One of the most frequently used methods for monitoring the ecosystems is LUCC analysis. Heterogeneous landscapes are of great importance, especially for wildlife to survive and develop in a sustainable way (Conception et al. 2008). According to the IUCN criteria, wild species

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