

From the Field to the Landscape: Designing a System for Assessing the Impact of Farming Systems on Biodiversity using Landscape Metrics - Abstract

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Summary

This paper deals with the effect of agricultural land-use practices on biodiversity. The case study is an extensive arable farming system on Limnos, a Greek island in Northern Aegean. The particular farming system combines arable crops grown for food or feed with grazing lands and sheep husbandry. We present the design of a system that (a) records farming practices of this system; (b) associates practices with biodiversity impacts on the bases of extended field work with farmers and measurements for annual plants and animals; (c) links the field and the landscape level with the use of landscape-metrics in a G.I.S. environment used to facilitate the investigation of the relation between landscape structure and biodiversity. The reason for this is that although farmers apply practices at the individual field and the farm level, many of the impacts are manifested at the landscape level.

The system of indicators and landscape-metrics will be implemented in a multi scale approach: -patch-classes-landscape-. At the field level all single fields of farmers will be considered as patches. Similar land-cover classes will form the secondary level of analysis. The landscape level will depend on the geomorphology and the land-cover at a scale of some square Km. Landscape metrics at the patch level will include diversity, shape, edge, patch density and size metrics. At the class level, metrics will include the frequency and size of patches, largest patch index, edge density, shape index mean, among others. At the landscape level, landscape structure and quantifying changes of this structure will be calculated with the use of indexes such as: Grain Index, Relative richness, Menhinich richness, McIntosh diversity, Shannon diversity and Simpson dominance.

The system of indicators will be built on (i) an application that farmers will use to record their practices at the field and farm levels; (ii) a GeoDatabase where spatial and non-spatial data from the application and the rest of the data will be stored, and standardized. This GeoDatabase will be accompanied by a Web-GIS system for geographical visualization and analysis.

During the application phase of the system, farmers will provide practices' information for their fields via the application for two cultivation periods in a number of case study landscapes across the island. Information will be standardized and

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processed and the selected metrics will be calculated. With the use of these metrics the impact of these practices and the system as a whole will be estimated and then presented to the farmers to help them improve their biodiversity performance while assisting the monitoring inputs/outputs of the use of the application. Finally, this work contributes towards informed-decision about farming in multiple scales.

Keywords: Landscape metrics; land -use practices; biodiversity.

JEL Codes: Q26, M35; L12.