

Landscape Diversity as a Screening Tool to Assess Agroecosystems Sustainability; Preliminary Study in Central Italy

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Abstract

Modernization of agricultural activities has strongly modified agricultural landscapes. Intensive agriculture, with the increased use of inorganic fertiliser and density of livestock, affects water quality discharging nutrients such as nitrogen and phosphorus in water bodies. Nutrients in rivers, subsequently, are excellent indicators to assess sustainability/land-use intensity in agroecosystems. Landscape, however, is a dynamic system and is the product of interaction amongst the natural environment and human activities, including farming which is a main driving force. At present not much has been investigated on the predictive role of landscape on land-use intensity. Aim of this study is to determine if, in Italian agroecosystem, landscape complexity can be related to land-use intensity. Indexes of landscape complexity (i.e. edge density, number of patches, Shannon's diversity index, Interspersion-Juxtaposition index) derived by processing Corine Land Cover data (level IV, 1:25.000) of Lazio Region, were related with land-use intensity (values of compounds of nitrogen and phosphorus and other parameters found in rivers monitored in accordance to European Directives on Waste Water). Results demonstrate that some landscape indexes were related to some environment parameters. Consequently landscape complexity, with further investigation, could be an efficient screening tool, at large scale, to assess water quality and ultimately agroecosystems sustainability in the absence of monitoring stations.

Key-words: landscape, agroecosystem, diversity, corine, indicator, river basin.

1. Introduction

Monitoring environmental quality of a territory is often complex as it includes the analysis of a great number of variables. The analysis of single components of the ecosystem can be made through indicators that, with different precision, can measure directly a specific parameter and indirectly an environmental state to which the parameter is linked. An indicator is a parameter, or a set of parameters, that gives information on the state of a phenomenon or of an area. The significance goes over the property directly associated to the value of the parameter itself (OECD 1993). An indicator needs to be a concise tool but at the same time it needs to be effective in the description. The validity of an

indicator can be assessed by its accuracy, meaning the capacity to detect a specific parameter and by its efficiency, meaning the capacity to easily detect the parameter.

In all those areas where human manipulation for agricultural production overlays the natural ecosystem, originating the agroecosystem (Caporali, 2000), agriculture practices can generate more or less impact according to the type of farming procedures undertaken (Altieri, 1995); the impact of the different agriculture practices on environment quality of agroecosystems is measured through different indicators. Water is one of the main renewable elements of agroecosystems, and rivers can be considered as the final basin, in time and space, of pressure and impacts of the surrounding terri-

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