Biodiversity protection funding preference: a case study of hotspot geoinformatics and digital governance for the Map of Italian Nature in the presence of multiple indicators of ecological value, ecological sensitivity and anthropic pressure for the Oltrepò Pavese and Ligurian-Emilian Apennine study area in Italy

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Abstract The environmental decision-maker is aware of the increasing difficulties in finding sufficient financial resources for nature conservation. So he must focus his attention on ecological situations that more than the others merit considering and defending because of elevated value but also because of risk for their intrinsic characteristics and for human pressure acting on them. Usually an ecological scientist focuses his attention on the natural patches of the landscape, analyzing their peculiar ecological traits forgetting that, even if we want to protect some environmental critical situations, this can be done only moving to the administrative partition of the territory since the central and local environmental stakeholders have primary interest in providing funds to those involved in those critical situations. The present work shows a methodological approach, consisting of a set of statistical and geoinformational tools, considering both ecological and socio-demographical indicators. The goal is not simply to give some general guidelines for environmental policies to the involved stakeholders but focuses more on finding out which administrative local partitions in a study area are more...
worthy to receive urgently the priority funds for biodiversity protection to face critical environmental situations often due to a combination of intrinsic ecological parameters and external human pressure ones. Obtaining results that cover 5% of the Communes involved in the area seems to be a realistic result that a decision-maker can support and fund. Methodologically and geospatial data analytically, the investigation offers interesting challenges for surveillance geoinformatics of hotspot detection and prioritization, because of the presence of multiple hotspots and multiple sets of multiple indicators.

**Keywords** Map of Italian Nature · Biodiversity protection funding preference · Hotspot geoinformatics · Digital governance · Hotspot detection · Multicriteria prioritization · Multiple indicators · Ecological value · Ecological sensitivity · Anthropic pressure · Oltrepò Pavese and Ligurian-Emilian Apennine study area · Ideal vector method · Multiple hotspots · Ecological attention · Ecological fragility

### 1 Introduction

Conservation planning is becoming increasingly important due to the growing threats to biodiversity and the limited financial resources (Mohan 1993; Poiani et al. 1998; Pierce et al. 2005).

The Italian protected areas cover about 10% of the national territory (Italian Ministry of the Environment, 2006) but this actual percentage should rise to 15% by the addition of new areas in the next few years.

The Map of the Italian Nature Project (Rossi and Zurlini 1998; Rossi 2001; Zurlini et al. 1999) envisions all Italy, but the starting step of it has analyzed 7 millions of hectares (about 23% of the national territory), mapping habitat types, according to the CORINE Biotopes Project Habitat Classification (CEC, 1991), and actually about 50% of Italy has been covered.

This national project aims:

1. to supply an overall representation and evaluation of the naturalistic patrimony of Italy, including the areas which are not officially protected in agreement with the idea that all the diffuse naturalistic traits play a strategic role in maintaining and preserving the protected areas;
2. to help in the individuation and evaluation of new areas of high ecological value but subjected to natural degradation and to excessive human pressure;
3. to help in the definition of the development lines of a territory in order to balance the necessity of the nature conservation and the exigency of the socio-economic development.

The basic assumption of the Map of Italian Nature is that zones of concentrated nature like Parks and Reserves and ones where nature and human activities can live together in a sustainable way (i.e. diffuse nature) are interdependent parts of a unique system and both should be included in the general planning at a landscape-level scale (Miller and Hobbs 2002; Poiani et al. 1998; Waldhardt 2003). This perspective requires strategies to couple environmental and socio-economic needs.