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## Naturalness and phytodiversity in Sicily

### Abstract

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The correlation between environmental quality and the floristic richness in Sicily has been analyzed. In particular, data concerning vegetation and its deterioration stages have been related with their relevant floristic richness in order of both providing a map of the environmental sensitiveness of the region and a first item of methodological interest for applied studies. The results show that a considerable plant diversity is mostly confined in small areas characterized by a high naturalness.

### Introduction

Integrated analyses of evolution stages of environmental systems combined with their relevant floristic diversity in function of evaluating the territorial environment sensitiveness are rare and usually overridden. In fact these studies are significant in regions whose as far as flora and vegetation are well known. Concerning Sicily, its territory has recently been surveyed in order to set up a medium scale map of the environment quality to be used for urban and territorial planning. Data obtained by this survey combined with the floristic information concerning each single geographical sector in the island provided the range of the floristic richness referring to previously mapped levels of naturalness. The first results of the integrated use of floristic and vegetation data are reposted below.

### Materials and methods

The study, based on literature data, photo-interpretation and field surveys, follows in part Ferrari & al. (2000).

In areas provided with vegetation maps, basic data for the classification of systems were previously analyzed and critically treated, and then confirmed by field surveys. In Sicily the Etna (Poli & al. 1991) and the province of Palermo (Raimondo & al. 2000) are well known, being provided with detailed maps in scale 1:50,000 covering on the whole, about 1/4 of total surface.

In the areas whose vegetation is not mapped, that cover most of the territory, the plant landscape were outlined *ex novo*. The main vegetation features were preliminarily defined by photo-interpretation and their distribution was subsequently reported on a map in scale 1:250,000.

In this preliminary step the map of the land use by the Amministrazione della Regione Siciliana, scale 1:250,000, and the most important literature on vegetation of Sicily were frequently consulted.

This preliminary work was supplemented by field surveys so that each single vegetation unit was delimited from both physiognomic and structural point of view. On this way a map of vegetation basic for other derived maps, as the map of natural systems, was set up.

The map of naturalness was elaborated by the integrated use of current tools of graphical representation (CAD) with a GIS (Geographical Information System).

The amount and the distribution of the main vegetation aspects provide useful elements for a synthetic evaluation of naturalness of ecosystems.

## Results

Following the criteria established by Raimondo & al. (2000) in a survey on the province of Palermo, in Sicily 12 levels of naturalness, grouped in 5 classes of systems, are to be distinguished: a) highly exploited systems; b) rural systems; c) semi-natural systems; d) sub-natural systems; e) natural systems. The 48% of the regional territory is covered by rural systems, mainly occurring in the hilly low mountainous inland. Highly exploited systems are also frequent (25.36 %) occurring in littoral and hilly areas of the provinces of Trapani, Catania, Agrigento, Palermo, Siracusa and Ragusa. Semi-natural systems have a considerable incidence occupying the 22.54 % of the region. They are more frequent in hilly and mountainous areas in the provinces of Messina (28.45%), Palermo (17.89%), Catania (14.17%) and Enna (11.16%) while are less spread in the provinces of Trapani and Ragusa. Sub-natural systems (3.37%) occur in the higher belt of natural reserves and of regional parks of the Etna, the Nebrodi (Caronie) and the Madonie. The richest provinces in partially-natural systems are the Messina (38.39%), Palermo (35.39%) and Catania (14.22%) ones, while these are almost absent in the provinces of Caltanissetta and Ragusa.

Subnatural systems refers to the rocky formations of medium and high altitude and to the higher belt of the Etna. These systems, corresponding to the 3.30% of the territory, mainly occur in the province of Catania and in a lesser extent in the Palermo, Messina and Agrigento ones (Fig. 1).

The highest vascular plant diversity is found in the province of Palermo, where according to Raimondo (2000) about 2,150 taxa occur, 1175 of them are confined in the area of Pizzo Carbonara-Piano Battaglia on the Madonie mountains (Fig. 2). This remarkable diversity – more than 70% in comparison with the whole of the Sicilian flora, consisting of about 3,000 specific and infraspecific taxa – is to be referred to the small extension of the Madonie mountains, about 2.5 % of the whole region, and is characterized by a high rate of endemics. The Etna Mount, like the Nebrodi (Caronie), the Peloritani and the Iblei ranges are also characterized by a high plant diversity. Nevertheless in these areas but updated data suitable for cartographic representation as

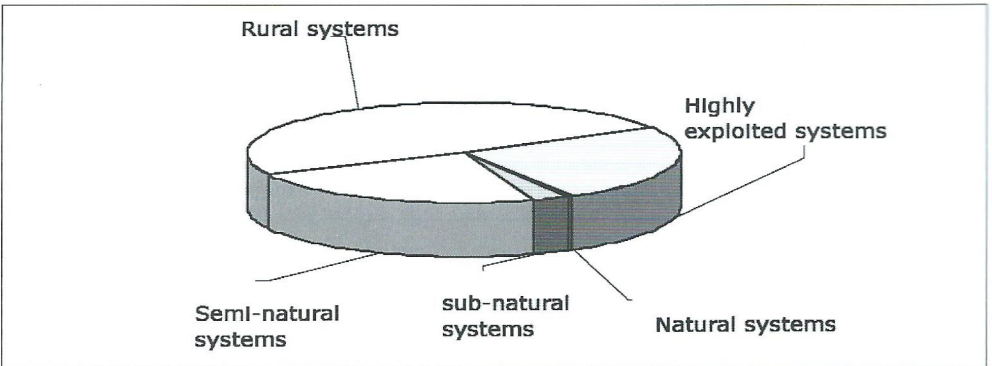


Fig. 1. Systems of naturalness and their incidence in Sicily.



Fig. 2. Example of landscape with different levels of naturalness in the Madonie Mountains (Carbonara Mount peak, W slope).

Table 1. Floristic richness of promontories and minor isles in Sicily.

Promontory or Island	n. of taxa	% endemics
Cefalù	292	3.08
Catalfano	577	7.97
Pellegrino	732	6.56
Gallo	674	7.57
Cofano	523	9.37
Eolie is.	658	3.19
Ustica is.	585	2.22
Egadi is.	711	5.91
Pantelleria is.	598	2.68
Pelagie is.	661	6.05



Table 2. Biological richness in the provinces, mountains and isles in Sicily (from Raimondo & Dia 1995).

<b>Province, mountain or island</b>	<b>n. of taxa</b>
Palermo	410
Trapani	184
Messina	426
Catania	325
Siracusa	117
Ragusa	43
Enna	104
Caltanissetta	45
Agrigento	136
Madonie mts.	318
Caronie mts.	216
Peloritani mts.	351
Etna mt.	307
Ustica is.	51
Egadi is.	42
Stagnone is.	26
Pantelleria is.	118
Eolie is.	127
Pelagie is.	83
Maltese is.	125
Sicily	650

Table 3. Mycological richness in the provinces, mountains and isles in Sicily (from Venturella & Mazzola 1991).

<b>Province, mountain or island</b>	<b>n. of taxa</b>
Palermo	310
Trapani	267
Messina	254
Catania	682
Siracusa	110
Ragusa	25
Enna	32
Caltanissetta	14
Agrigento	32
Etna mt.	382
Pantelleria is.	204
Caronie mts.	123
Madonie mts.	65
Sicily	1477

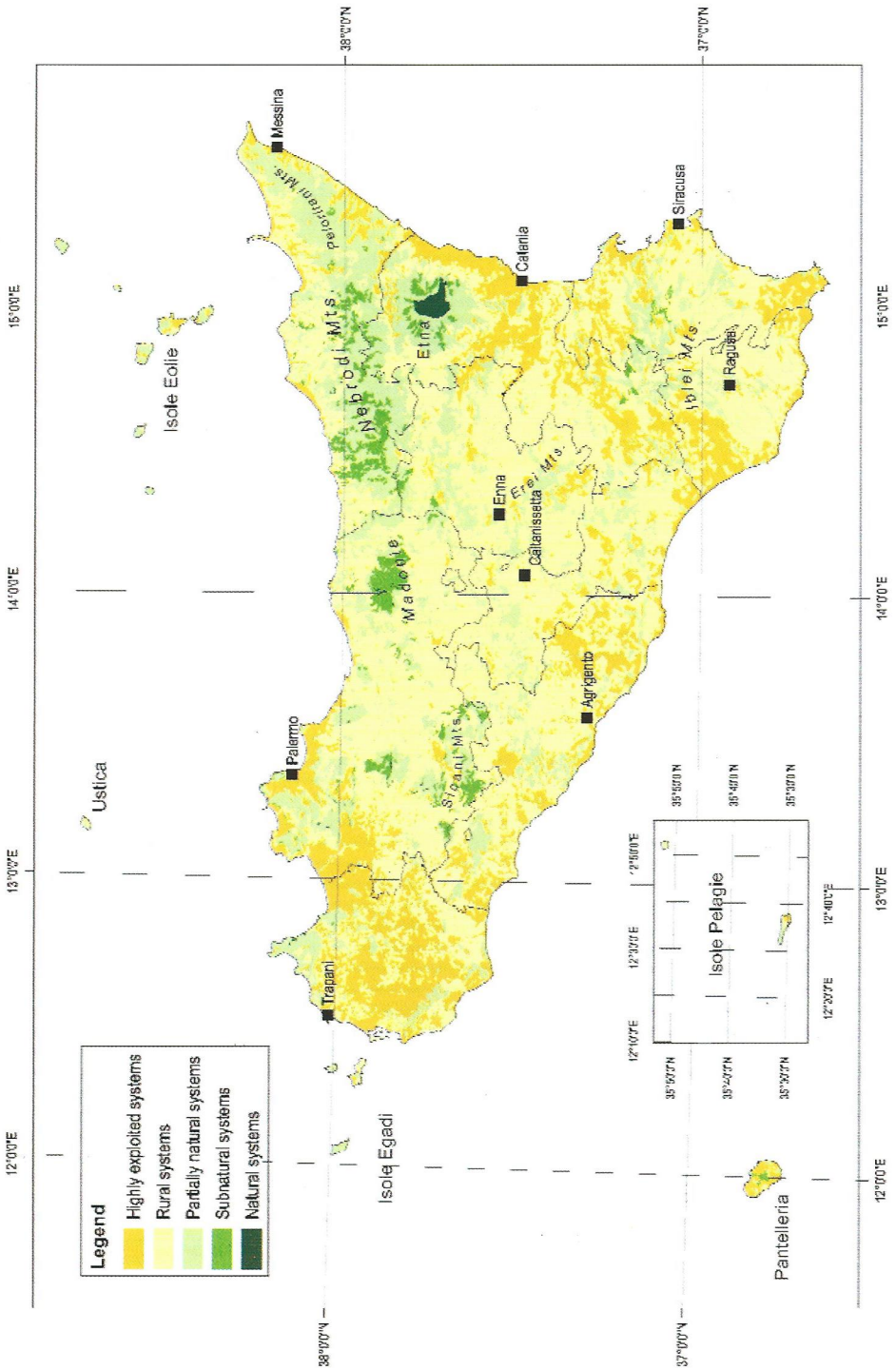


Fig. 3. Map of the degree of naturalness of environmental systems in Sicily.

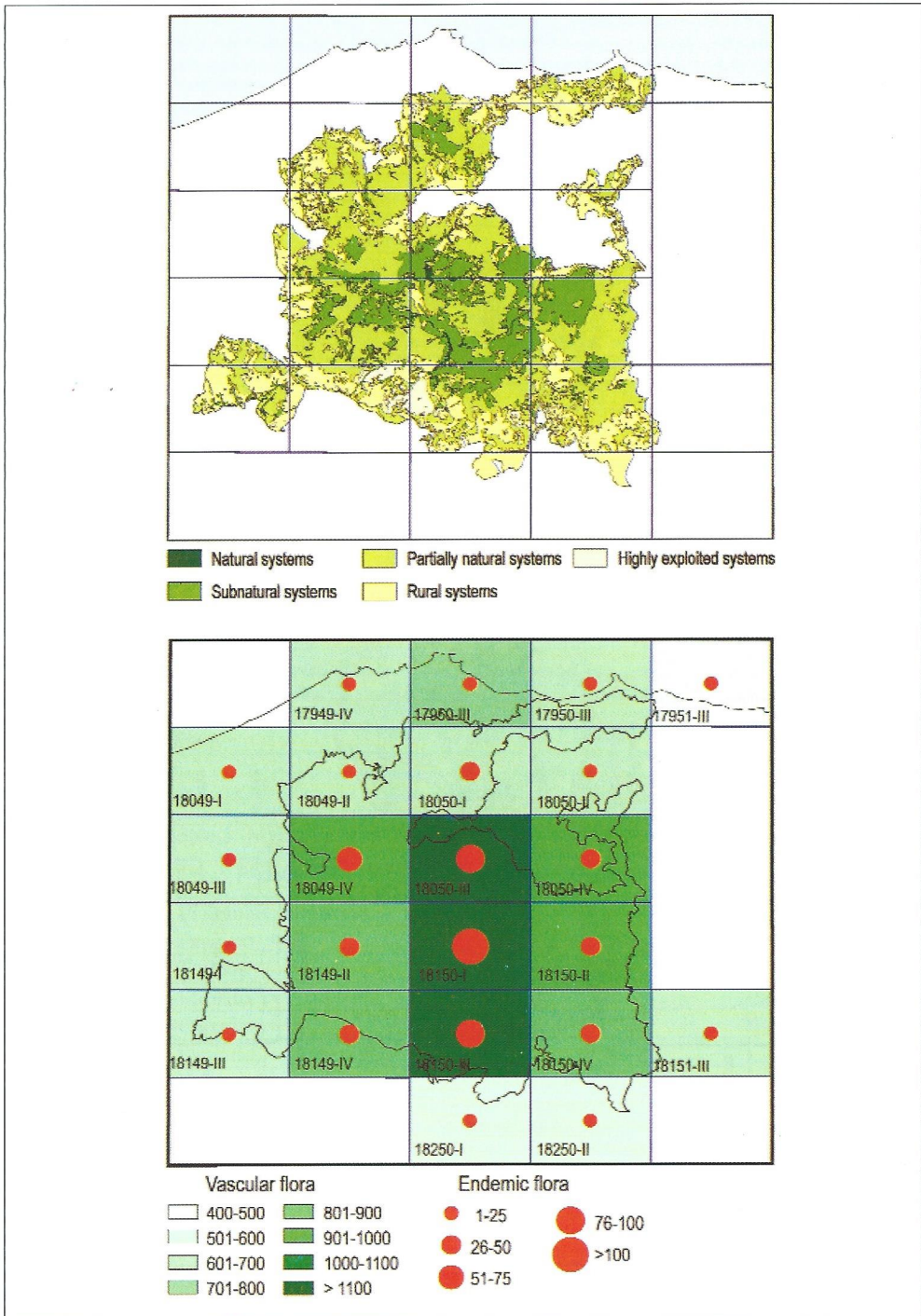


Fig. 4. Correlation between naturalness and floristic richness in one representative area of Sicily (Madonie Natural Park).



for the Palermo province are missing. Some other islands of plant diversity are the carbonate promontories along the Tirrenian coast from Tindari up to Erice (Tab. 1) (Raimondo & al. 2002), the Sicani mounts (Marcenò & al. 1985), the area of Ficuzza and Rocca Busambra south of Palermo (Gianguzzi 2004) and Cava Randello on the Iblei mounts (Giardina & al. 2002). The plant diversity in the minor isles around Sicily is remarkable consisting of 1313 specific and infraspecific taxa 101 of which are endemics (Tab. 1) (Mazzola & al. 2002).

Regarding other floristic components, only briological (Raimondo & Dia 1985) and mycological (Venturella & Mazzola 1991) information is so far significant. These data are comparable for the 9 provinces and the mountains and insular systems (Tab. 2 and 3).

As far as the brioflora is concerned, the diversity in the provinces of Messina, Palermo and Catania is assessed by 426, 410 and 325 specific and infraspecific taxa, respectively (Raimondo & Dia 1985). A high richness is also found in the Peloritani (451 taxa), the Madonie (318) and the Etna (307) as well as in the islands Pantelleria (118) and the Eolie (127).

The mycoflora consists of 1564 specific and infraspecific taxa belonging to 496 genera and 189 families (Venturella & Mazzola 1991) that remark the richness of the provinces of Catania, Palermo, Trapani and Messina, respectively, and of the island of Pantelleria and the Etna, the Caronie and the Madonie as well. According to more recent surveys (Venturella & al. 2005), the macromycetes in the province of Palermo consist in total of 1053 specific and infraspecific taxa. Furthermore, on the Madonie 614 taxa have been recorded (Venturella & al. 2001) and in the area of Ficuzza – Rocca Busambra to 741 (Venturella & al. 2000).

## Conclusions

The data above shown have a their own interest, apart from the finality of the study. The approach used was useful to prepare basic reports on the quality of the landscape and on the amount and distribution of the biodiversity of Sicily. After the drafting of the map of the degree of naturalness of environmental systems (Fig. 3), in which different degradation levels of vegetation are defined, the data concerning the distribution of floristic richness (Fig. 4) will allow us to draw a further map that could be called “map of environmental sensitiveness”. This will provide the naturalness degree, considered not only as the distance a each system from its own climax or subclimax but also as a scale of environmental sensitiveness to be used as a tool for the evaluation of the biological risk overhanging on single systems. This, especially in territorial plans involving the conservation of biological resources.

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