

Thematic maps for environmental and landscape compatibility in Sicily for projects on energy crops

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Abstract: This study aims at verifying the environmental and landscape compatibility of energy crop cultivation in Sicily, by means of georeferenced thematic maps.

GIS was used to identify suitable areas for cultivation and each map is made up of a set of shapefiles which represent the desired themes to be highlighted at any given time.

Processing thematic maps for environmental and landscape compatibility for energy crops identified territorial zones with different levels of environmental impact.

The GIS simulation around Mineo (Catania, Eastern Sicily) suggested cultivating rapeseed and *Brassica carinata* in the areas where wheat crops are currently grown. The thematic maps of the Mineo area suggest that appropriate areas must be defined to preserve the rural traditional landscape around each historical/cultural asset.

Keywords: thematic maps, energy crops, landscape, GIS

Introduction

Biomass fuel is one possible form of renewable energy, as reported in the *Biomass Action Plan* (COM 628, 2005).

The *Regional Energy Report of the Sicilian Region* (2007) considers implementing both biodiesel and bioethanol on an experimental and local scale, by encouraging research to set up suitable crop models for energy production, by selecting genotypes and developing low input production models to ensure positive energy balance and a reduction of CO₂ emissions.

This work aims at evaluating the environmental and landscape compatibility of introducing energy crops in Sicily, by means of georeferenced thematic maps.

Methodology

In order to elaborate thematic maps, information and materials collected from Mineo (Catania, Eastern Sicily, lat. 37°16' N, long. 14°41' E) were analysed by means of GIS georeferencing the constituent elements: land use, natural features (parks, reserves, oasis, Sites of Community Interest, Special Protection Areas), historical/cultural features, as classified in the *Guidelines for Planning Sicilian Landscape* (1999) (Failla et al., 2005a). Moreover, the presence of Protected Designation of Origin (PDO), Protected Geographical Indication (PGI) and Traditional Speciality Guaranteed (TSG) (Failla et al., 2005b) was verified. 1:10.000 scale cartography was used for basic maps and appropriately structured modular GIS on a platform interfaced with Intergraph Geomedia® software.

Two crops, *Brassica napus* L. (rapeseed) and *Brassica carinata* L., were considered as replacements for durum wheat because of their compatibility with the soil and climatic characteristics of Sicily.

Results

Brassica carinata could be used as an alternative to rapeseed, since it demonstrated a greater adaptability to the Mediterranean environment than *Brassica napus* and its high productivity seems to be due to its higher resistance to fruit dehiscence, lodging, main adversities (parasites and cryptogams) and water stress (Copani et al., 1999). Crop management, from seed bed preparation to harvest, is similar for both species and, in view of rotating these crops with durum wheat, its

mechanisation remains largely unchanged (Copani et al., 2007). From a landscape point of view, replacing the crop should present no significant visual impacts, because both species are similar in plant habit and height, with the same cultivation season; pleasant morphological differences are the yellow flowering seen at considerable distances, and the brown of the plant at the end of the growing season (Cosentino et al., 2006).

The GIS simulation around Mineo suggested cultivating rapeseed and *Brassica carinata* in the areas where wheat crops are currently. Moreover, there is no wheat within the zones dedicated to typical agro products (red orange and olive oil).

The maps show many components of the protected natural and historical/cultural systems. It is evident, therefore, that the inclusion of rapeseed and/or *Brassica carinata* may modify the landscape where there are historical assets, as shown in Figure 1.

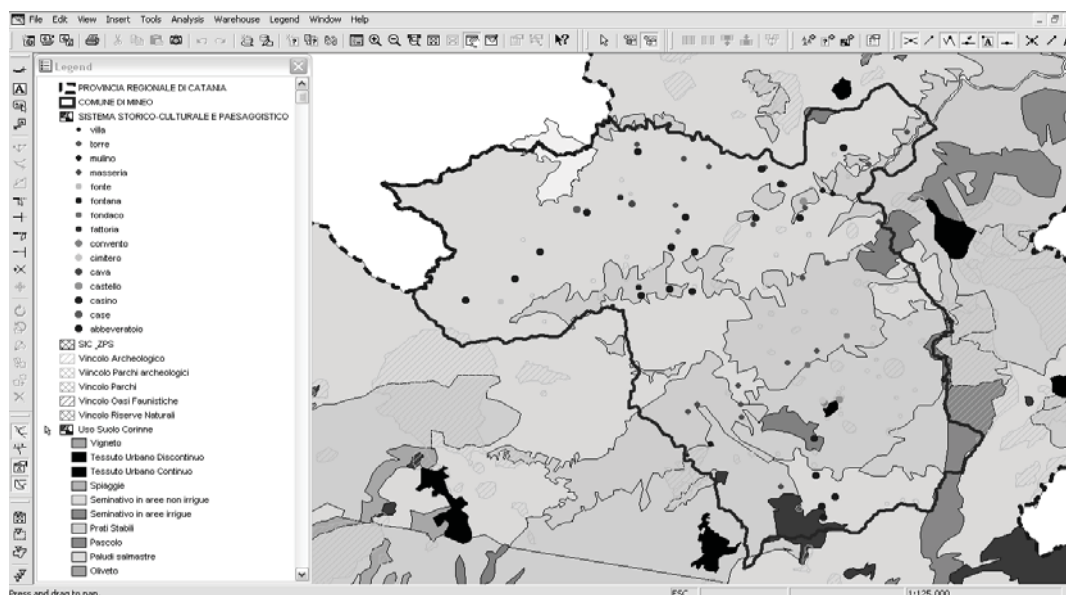


Figure 1. The GIS simulation of Mineo

Conclusions

The GIS thematic maps can help evaluate both the environmental and landscape compatibility of biomass crop introduction in the target area.

The proposed methodology highlighted how the introduction of energy crops in certain territories where historical/cultural assets predominate could modify the landscape of the area compared to traditional crops. Landscape is the identity of any specific territory and together with its historical assets needs to be saved and protected together with the whole environment in which they are placed.

Therefore, the thematic maps of the Mineo area, according to the *European Landscape Convention* (2000) and to the *Code for Cultural and Landscape Assets* (2004), suggest that appropriate areas must be defined to preserve the rural traditional landscape around each historical/cultural asset.

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