

GEO-ENVIRONMENTAL ANALYSIS FOR THE SUSTAINABILITY OF CAMPI FLEGREI LANDSCAPE

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The soil is not only an abiotic component but it is also the site where important processes of ecosystem functioning take place; it is the result of the combined action of climate, organisms, morphology and time action on the rocks; the man interferes on natural processes thereby causing further changes. It is, however, a natural resource being unable to regenerate, and thereby in planning activities it is important to use maps able to represent the evolution of land use and obtain dynamic data supporting decision-making in the sustainable management strategies of landscape and environmental assets.

RIASSUNTO: Cirillo C. *et al.*, *Analisi geoambientale per la sostenibilità del paesaggio dei Campi Flegrei*.
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Il suolo non è solo una componente abiotica ma anche il sito dove si svolgono importanti processi di funzionamento dell'ecosistema; esso è il risultato dell'azione combinata del clima, degli organismi, della morfologia e del tempo sulle rocce; l'uomo interferisce sui processi naturali apportando ulteriori modificazioni. Esso è, però, una risorsa naturale incapace di rigenerarsi, e per questo è importante avvalersi, nelle attività di pianificazione del territorio, di cartografie in grado di rappresentare l'evoluzione dell'uso del suolo e ricavarne dati dinamici a supporto delle decisioni delle strategie di gestione sostenibile dei patrimoni paesaggistici-ambientali.

Key words: soil, historical cartography, GIS

Parole chiave: suolo, cartografia storica, GIS

The purpose of this paper is to define a methodology for land analysis aiming at identifying environmental changes caused by the anthropic activity through a vision having a multidisciplinary nature of the abiotic and biotic components. This is achieved through the reconstruction of a cartographic model representing the historical evolution of land and environment. Such an approach, in course of experimentation, was tested on a precise land sample: the Regional Park of Campi Flegrei. The choice was dictated by the presence of morphologically interesting features of the landscape from the soil system point of view. Campi Flegrei offer a unique landscape featuring interweaving an environmental framework and anthropic stratifications favoured by climate and soil fertility. The use of valuable crops, including vines, has characterized and still characterizes the agricultural productivity of this area; Campi Flegrei historical vines constitute a mark on the landscape area able to trace the history of land use and describe the its changes. Soil is a complex evolving system, structured by physical, chemical, biological and time factors to be analysed with respect to the relation-

ship occurring between the elements (BULLINI *et al.*, 1998). The transformation of land use is listed as one of the causes of deterioration as the change of land from natural to semi / natural or artificial utilization involves the loss of fertile soil because of the negative environmental impacts, which cause the fragmentation of the territory, the loss of biodiversity, alterations of the hydrogeological cycle and microclimatic alteration. The study of the evolutive dynamics of the structure of the Flegrean soil, achieved by comparing historical maps, is an example of analysis of land and environment changes; by integrating data on morphological evolution of the Flegrean soil, extracted from georeferenced historical maps in GIS environment and from the most recent ones in a digital terrain model (DTM), it may be obtained the representation of the soil surface together with the changes of use. The study provided for the selection according to classes as identification tools of the essential elements being present in the area following the provisions of the *Corine Land Cover* and *Corine Biotopes* classification systems. The comparative methodology made use of the land utilization map

of the year 1907 realized on the basis of the IGM cartography interpretation and Murat cadastral map of 1811 in order to have accurate data on the socio-economic, anthropological, and environmental aspects of Southern society in the nineteenth century. From the map of Naples province (DE LORENZO R. *et al.*, 2008) on the vines areas in Murat age, extracted from documents of that time being indicative of the crops classes, it results that Campi Flegrei are within the areas specialized in viticulture. The thematic mapping was carried out according to data from Murat Cadastre, made by the land valuations produced and contained in the summary tables grouped by municipality; this shows how historical registers are very useful for the reconstruction of regional planning. These administrative tools are based on maps that reproduce the territory divided into particles, uniform minimum unit referred to the ownership, the intended use and the quality of the soil, exactly reproducing the geometric elements of the land, buildings, roads, rivers, cultivated fields and uncultivated land. Also the IGM military cartography shows a synthetic and at the same time detailed image of the territory whose physical components as well as physical and legal components are reported with extreme precision. Aiming at the cartographic comparison it is fundamental to georeference the historical maps, a task that requires the application of innovative methods of reading

the contents of metric and topological maps of ancient maps thus allowing to have the same reference system (MARCHETTI, 2000), thereby obtaining the extraction of homogeneous geographic data being therefore comparable with each other.

At the same time the inclusion of geomorphologic information of the area, historical climate series and ecological information on these biotic components will allow us to have an overview of the factors relating to forcings which jointly with anthropic actions determine the soil evolution. The outcome of the application of the methodology allowed to recognize and understand the signs in the area being the result of the organizational structures dating back to the past, traces which have partially lost spatial and/or functional relationships of those systems.

REFERENCES

- BULLINI L., PIGNATTI S. & VIRZO DE SANTO A. (1998) - *Ecologia generale*. UTET, Torino.
- DE LORENZO R., GALLUCCIO F. & SCARPA L. (2008) - *Cartografia e catasto napoleonico. Uno studio sulla provincia di Napoli*. Atti Seminario Dalla Mappa al GIS, Brigati, Genova.
- MARCHETTI M. (2000) - *Metodologie per una cartografia di uso del suolo multilivello e multiscala: analisi e sperimentazione applicativa*. Relazione finale, documentazione gruppo di lavoro "uso e copertura del suolo", Centro Interregionale, Roma.