LANDSCAPE PROTECTION AND TOURIST VALORISATION OF THE CULTURAL AND NATURAL HERITAGE OF THE UNESCO SITE OF MATERA (ITALY)

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Abstract
The use of advanced technological tools may considerably support the protection of landscapes with high cultural and naturalistic value, since they allow the implementation of multidisciplinary information, which may reveal crucial for a sound management of sites representing an heritage of outstanding value. In the present paper, a special analysis has been focused on the UNESCO site of the City of Matera, located in the Basilicata region (Southern Italy), where some protected habitats (Natura2000 areas) still coexist with a considerable number of cultural sites, earning to this location the role of European Cultural Capital in 2019. Suitable conservation strategies, focused to preserve the natural and cultural landscape, which may be affected by increasing touristic flows, are then necessary. A Geographical Information System of Matera's tourist routes, starting from already existing ancient paths, was implemented to develop new public recreation activities without negatively affecting the surrounding landscape. A specific database was therefore designed for the Matera landscape, which has been implemented with the dual purpose to be a useful tool for planning a sound management of the landscape structures and, through the implementation of a Web-GIS, to create new opportunities for enjoying the urbanized territory in close contact with natural landscapes.

Key words: cultural landscapes, protected habitats, sustainable tourism, Geographical Information System, Matera.

Introduction

Landscape planning requires an integrated approach, due to the need to join the touristic valorisation with the preservation of naturalness. So, multidimensional and multidisciplinary analysis methodologies are needed (Antrop, 2000). Moreover, it is necessary to use different types of data (spatial and non-spatial) with different characteristics (from historical data to digital cartography) to evaluate, in an holistic way, every aspect concurring to shape the landscape (Statuto et al., 2017). The use of a Geographical Information Systems (GIS) is very helpful, since it allows several analysis suitable for tourism purposes. Indeed, there are many examples of application of a GIS to implement territorial marketing strategies (Albuquerque et al., 2017) or to valorise the sustainable development of rural tourism (Statuto et al., 2017). Furthermore, in sites which are highly sensitive to management issues, a GIS approach could support a decision-making process based on the dual objective of enhancing and protecting natural and cultural heritage (Berg, 2012; Xishihui Du et al., 2018). A GIS methodology may be applied to provide a useful tool to public decision-makers, to guarantee the integrity of the landscape and to select the best strategies for the valorisation of the rural territory (Statuto et al., 2013).
One the most complex examples in Europe of natural and cultural landscapes simultaneously present in the same location, which are currently suffering for an unsustainable increase in anthropic pressure resulting from a sudden growth of

tourism activities, is the UNESCO site of “Matera”. The City of Matera, located in the Basilicata region (Southern Italy), has been designated as an European Cultural Capital in 2019. It is the city of Italian art having in last seven years increased more (+152.4%) the volume of its visitors (Centro Studi Turistici, 2017). As well as the protection strategies, that can be implemented towards historical sites from environmental condition (Gizzi et al., 2016), the increase in the tourist flows is also determining several problems as: the depopulation of the typical "Sassi" dwellings in favour of commercial activities, that determines a loss of the cultural identity of these places; the overcrowding of naturally sensitive areas, with an high tourist interference which endangers the integrity of some habitats and species protected by European Commission. With the aim to provide a tool useful for the public decision-makers, able to manage these important issues, in the present paper a methodology for the implementation of suitable conservation strategies through a GIS is presented. The first step has been the realization of an inventory of resources and the creation of a database with new public recreation activities which don’t negatively affect the surrounding landscape. The second part of the paper concerns the creation of a Web-GIS aimed to satisfy people's needs, through an integrated platform with highly-visualized natural and interactive functionality (Chang et al., 2011).

Material and methods

The City of Matera (Fig. 1) is well-known for its extensive cave-dwelling area, the “Sassi”, a UNESCO World Heritage Site designated since 1993. The “Sassi” provide a stunning backdrop of stairways and narrow lanes, cave-houses carved out of the rock, rock churches with magnificent frescoes. Alongside the historical-cultural aspects, the Matera landscape is made up of relevant naturalistic elements: the Natural Historic Archaeological Park of “Rock Churches”; a Special Area of Conservation (SAC) as well as a Special Protection Area (SPA), both included in the UE network of protected sites (Natura 2000). All archaeological, cultural and naturalistic sites form an area with an extraordinary tourist appeal.

Fig. 1: The study area of the “Matera” UNESCO site

The first step has been to realize a spatial data collecting and processing the existing available open data concerning natural and cultural heritage. In this way, it has been possible to organize a common and updated database of this area, that can be the tool for all the following steps analysis. The sources consulted were: the

Basilicata Region data catalogue; some relevant “Natura2000” reports; the national/regional touristic and naturalistic databases; management plans; LIFE program data; Open Street map GIS database. The database has been standardized in the format, both in the topology and in the coordinate system. Data were aggregated for macro categories, so as to optimize the final results. A field research has been scheduled to collect necessary data which were not available. To each element of the database, a unique identification number (ID) has been finally assigned, so as to facilitate the subsequent phase of consultation, management and updating. In the second step, thanks to the use of historical cartography (Statuto et al., 2016), some ancient paths was identified, and the most interesting among them were chosen and modified in relation to the database previously created and the current land use. Subsequently, the different cultural sites along this path - excluding routes crossing areas which are fragile from a naturalistic point of view - were mutually inter-connected. The choice of the areas to be excluded was carried out on the basis of the breeding sites of some amphibians which are considered threatened in Europe (Picuno, 2017) and on the Sassi’s areas with the highest nesting concentration of *Falco naumanni* Fleischer hawk (IUCN, 2016). Finally, the main route and the secondary perspectives have been calibrated through the use of a specific QGIS plugin (Walking time), which allows to estimate the travel time (in minutes) and in reverse direction, along with a line depending on the slope and in accordance with the type of walking or walker. All operations were performed with the QGIS 2.18.13 software.

Results and Discussion

The first result coming from the implemented methodology has been an integrated database with geo-referenced tourism resources, environmental and landscape heritage of the city of Matera (Fig.2). This tool allows to have a flexible and exploitable management system for different objectives, going from the identification of environmental incompatibilities to the creation of new tourist activities. In this way it is possible to plan new paths modifying the old routes.

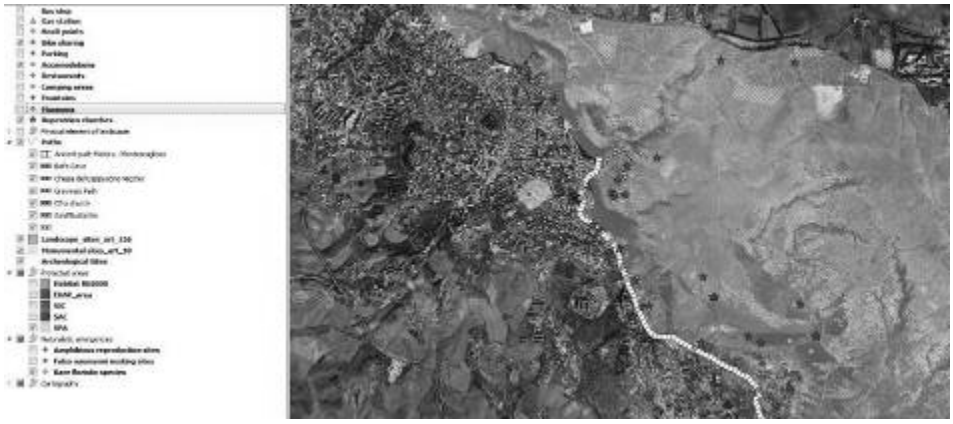

Fig. 2: Database of touristic resources, natural and cultural heritage of Matera

One of the paths is the old sheep-track “Matera-Montescaglioso”, that starts from Matera and ends at the Benedictine abbey of “St. Michael the Archangel” in the town of Montescaglioso (Fig.3).

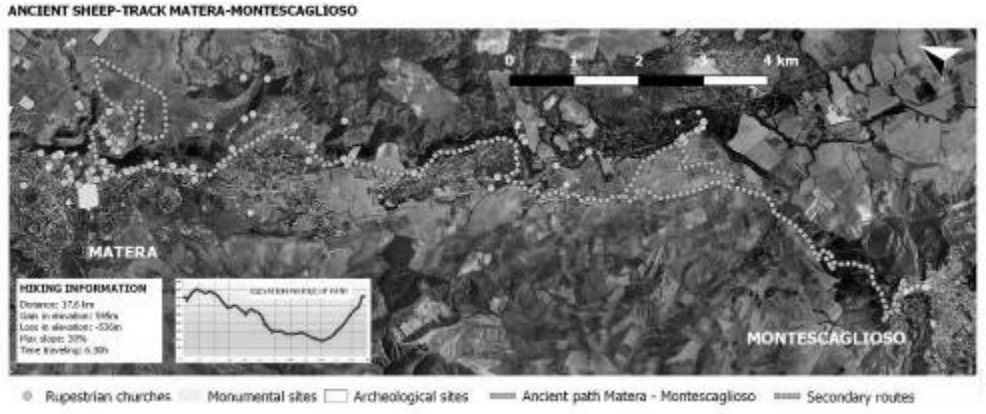

Fig. 3: Digitalization of old sheep-track Matera-Montescaglioso

Thanks to the data included in the GIS, it has been possible to associate this information with those useful for hiking purposes (slope, time travelling, elevation profile, etc.). In addition, the interoperability of modern GIS tools allows a rapid and effective implementation of products useful for the promotion of heritage, such as a Web-GIS. Starting from the main database, a demonstrative Web-GIS platform has been therefore created, and a navigable 3D system has been realized, so as to plan tourist activities more engaging and "immersive" (Fig.4).

Fig. 4: Screenshot of the created web-GIS

Conclusion

The development of digital and online geographic technologies has increased the opportunities to develop new applications for landscape management and marketing, from which the public decision-makers and tourists can benefit. The creation of these tools requires a phase of in-depth research of the territory, in order to create a system that is as complete as possible. Furthermore, it is essential that public administrations implement "open government" policies, finalised to have access to obtain high quantities of open data. It is essential, namely, that these

databases are dynamic and quickly updated through, for example, a shared system in which the different actors can have access to the data. The GIS tool allows in conclusion to plan with a good accuracy the tourist activities in a proper way, so supporting to find the right compromise between fruition and conservation of the landscape.

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Souhrn
V tomto článku byl využit potenciál nástrojů GIS pro implementaci metodiky umožňující jak valorizaci, tak i ochranu krajiny. Oblastí studia je místo UNESCO ve městě Matera, které se nachází v oblasti Basilicata (jižní Itálie), kde některá chráněná stanoviště (oblasti Natura 2000) stále existují společně se značným počtem kulturních památek. Analýza prvního kroku zahrnovala shromažďování a standardizaci údajů o přírodním a kulturním dědictví souvisejícím se zdroji cestovního ruchu. Realizace správné databáze je zásadní, protože představuje spojovací prvek mezi všemi aktéry, kteří se zabývají územním plánováním. Počínaje touto geodatabází, až po digitalizaci starých tras, je plánována nová trasa založená na zajímavostech a především mimo oblasti, které představují mimořádné zásahy do životního prostředí. Konečně, za účelem podpory a rozšíření oblasti byla vytvořena první verze Web-GISu.

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