A framework for cultural heritage management and research: the Cancellara case study

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ABSTRACT

This paper deals with the approach used to create the digital cultural heritage map (hereafter, c.h.) of the mountain village of Cancellara and its territory, located in Basilicata, Southern Italy. The map is thought to be an exhaustive georeferenced catalogue of sites of cultural interest to bring fresh insights and new life to the c.h. and support decisions for their protection, management and valorization by the municipality and public bodies, national and regional, designated to fulfil the duties in ensuring the protection and accessibility of cultural heritage. A digital c.h. map is also important and useful for scholars who conduct studies and investigations as well as for private companies and cultural associations which work in the field of Cultural and Creative Industry. This map allows access to information useful for the reconstruction of the history of the place, dispersed among various private and public archives or unpublished. The map includes a chart at the territory scale, and more detail for the built-up area and its historical centre. It summarises data from heterogeneous sources.

1. Introduction

The use of GIS cartography is an essential tool for the protection and the management of local or regional cultural heritage.

The protection of c.h. and cultural landscapes is enshrined in national and international protocols: the Operational Guidelines of the Convention UNESCO World Heritage (UNESCO, 1992) and the Mediterranean Landscape Charter adopted in Sevilla in 1993 (Zoido Naranjo, 1998) are aimed at supporting c.h. and landscape conservation policy ‘to meet the threats that uncontrolled development pose for ecological and historical landscape values’ (Jones & Stensek, 2011). Management and protection have a key role in territorial and social development, but c.h. is continuously under pressure because of its inherent fragility and its exposure to different types of anthropic and natural risks (Masini & Soldovieri, 2017).

The knowledge of c.h. and the ‘basic’ operation of cataloguing is therefore fundamental to empower collective awareness and territorial identity, for economic growth deriving from tourism or other economic assets such as the renovation and construction industries as well as for scholarly research.

GIS cartography improves the knowledge and allows the construction of a cognitive framework useful as a starting point for every type of activity concerning cultural heritage. It must be enough flexible to meet the needs of the different social actors in heritage studies such as territorial planners, policy makers, schools, universities, researchers, commercial actors, and citizens. As an example, a territory map with a complete catalogue of cultural heritage could easily be incorporated in the work of protection and management, such as urban and territorial planning instruments and civil protection programs. The issue is timely because several factors threaten the conservation of the cultural and rural landscape in the Italian countryside (Murgante & Danese, 2011; Murgante, Las Casas, & Danese, 2007; Nolè, Danese, Murgante, Lasaponara, & Lanorte, 2012). These include the visual impact of new urban elements (Danese, Nolè, & Murgante, 2009); renewable energy production, including wind farms (Danese, Las Casas, & Murgante, 2008); the effects of fire, and urban sprawl.

A cartographic catalogue can serve as an instrument to support institutional protection at a preventive level and to manage the application of technical and legal rules that constrain the use of cultural property, through the imposition of safeguard measures. Lastly, an updated, complete framework is also needed by research activities as a study instrument or as a starting point to construct a Decision Support System for predictive and preventive archaeological studies (Danese, Masini, Biscione, & Lasaponara, 2014), or for heritage preservation use.

Territorial cultural heritage needs much more than a catalogue of the most important historical monuments to be exhaustively and effectively mapped. The Recommendation on the Integrated Conservation of Cultural Landscape Areas (Council of Europe, 1995), the
Florence Declaration on Landscape (Unesco & ICOMOS, 2014) and the Italian L.D. 42, make a distinction between landscape and cultural landscape, highlighting the importance of their protection through international collaboration and stressing that landscape assets and cultural property, must have recognition as being of ‘Cultural Interest’.

This concept is very important in Italy because the Italian countryside is dotted with historic villages: their c.h., with large and heterogeneous types of assets, their chronology and function, and their surrounding territory form a fundamental part of the cultural landscape of a region. As expressed by the European Landscape Convention (Europe, 2000), the landscape derives from the natural and human action and from their interrelationships; so all these elements are important in fostering the cultural identity.

It follows that it is essential, for research on territory and for more general knowledge, to consider the following elements and their interactions: (a) settlements, infrastructures, environmental and cultural components, (b) typological, chronological and spatial relationships, and (c) changes and trends over time (Cambi & Terrenato, 1994; Civantos, 2006; Volpe & Goffredo, 2014).

Furthermore, the Italian countryside landscape is characterized by a long history of habitation and by the presence of several sites, often stratified, and insufficiently explored from the archaeological point of view. In many cases, as in Basilicata, the studies carried out are sectorial, even rigorous but without the use of technological aids, they are poorly disseminated and communicated. These are mainly monographic summaries or address individual elements or historical moments. To fill these gaps and to construct a cartography as a basic starting point for building useful and effective knowledge we think it is necessary to deepen the knowledge of cultural heritage: first by taking into account the heterogeneity of sources and data, and second by evaluating them as a whole. Since the 1970s, research on territory provided a method based on interdisciplinarity, diachrony, ethnoarchaeology and spatial analysis (Mannoni, 1975). In the decades since, the traces of the past are considered not as isolated elements but a complex whole of finds, symbols of identity of the people who still live in them (Brogiolo, 2014). Most of the heritage objects in Italy are not single objects or monuments but form part of a whole, and the overall fabric, visible today and still alive (Settis, 2007). Deepening multi-temporal and multi-scale diachronic knowledge is needed, especially when the main aim is the preservation.

In this article, we construct a Cultural Heritage Map (C.H.M.) of the territory of Cancellara, as an example of a tool for planning and management, to identify landscape values and local contexts to protect, and as a guide to new research.

2. Methods and case study

The research aimed to collect information about c.h., landscapes and their interaction in a specific territory (Cavazza, Podini, & Tirabassi, 2014; Leonardi, 1992), according to the following stages: (1) collection of archaeological data on current maps (2) control of the collected data by checking reliability of previous research and using specific analysis (3) data formalization and aggregation. The aim is to provide a comprehensive basis for historical interpretation and also suggestions for further investigations.

Cancellara is a small town in the Basilicata region in southern Italy. It is located 680 m a.s.l. and it is surrounded by hills (between 424 and 1063 m a.s.l.). The residential area spreads to the East following the morphology, built on the only slope not affected by landslides. The current land use is arable production, uncultivated lands and wooded areas; past agricultural production included vineyards, olives, cereals and legumes, and there are the ruins of watermills. All of these are confirmed by archival documents. Together with geographic, historical and social features, it is clear that occupation of the region stretches back centuries, and there were settlements of different historical epochs in the surrounding area. Cancellara exemplifies a long history of sequent occupation, leaving a cultural imprint which may be revealed by a mapping work.

The latter was developed in two stages and articulated at two investigation scales. We will briefly mention the first stage (Biscione & Danese, 2012) and describe the second stage in greater detail, which included the construction of a framework and the c.h. map realization.

In the first stage, the research focused on the historical centre of the community, both on single buildings and urban design (Figure 1). We surveyed and analysed building characteristics (materials, masonry characteristics, the surface finish of the ashlars and trace of used instruments, presence of artefacts, and phases of construction) supported by bibliographic, archival and institutional sources. We entered this data in a specially developed geodatabase, with a photographic survey of the façades. We hypothesized and reconstructed the historical phases of urban evolution. By focusing on the architectural heritage, the first phase provided a basis for a thorough understanding of the historical, cultural and natural background of this municipality (Biscione & Danese, 2012). Cultural assets lacking archaeological, architectural and environmental protection restrictions were identified and mapped.

In the second stage, we developed the Cultural Heritage Map presented here. The construction of this map, at territorial and urban scale, was made in two phases: (i) the first for data collection, (ii) and the second for the geodatabase and map construction (Figure 1).
Data collection involved deepening knowledge through consulting very heterogeneous sources including historical cartography, satellite images, aerial photographs, iconographic sources, inscriptions, documents, bibliographic and archival sources, oral traditions and institutional documents from superintendent offices, museums and the municipality. We garnered, for example, information about historical decrees and some documented geological peculiarities (such as small mud volcanoes identified in the southwest area named Bufate). Then, we examined archaeological data from surveys and completed excavations, and from the existing evaluations of archaeological impact. Archaeological data supplemented evaluation of the morphology of the territory, historic place names and roads, hydrography, and historic roads patterns. This began a reconstruction of the evolutionary stages of the settlement. Even the archaeological constraints in the territory were considered. Finally, a field survey was carried out to gather further information, to verify our data, and to identify precisely the existence, the position and visibility of archaeological sites, ruins, ancient roads and, in general, traces relevant to the evolution of the landscape. Unfortunately, a high percentage of data cannot be recovered today because of landscape changes, or a low visibility index (e.g. covering vegetation, or areas impossible to traverse on foot).

For the geodatabase and cartography, the information was transformed into formalized data according to its characteristics, and entered in a geodatabase following the data model of the ESRI Geodatabase. Features validated are shown on the current map and some elements of geo-environmental analysis were added, in order to understand the value of the findings in relation to landscape evolution.

The GIS data model is constituted by three types of elements:

- **Point features**, containing location and information related to c.h.;
- **Linear features**, containing a catalogue of protected cattle-tracks;
- **Areal features**, representing archaeologically sensitive areas.

The point features identify every cultural asset in the study area. Eight categories of cultural assets have been
identified among which five are tangible, and three are intangible (Figure 2). The five tangible c.h. categories are: (1) memorial artefacts, including inscriptions and re-used inscriptions (spolia), crosses and votive aedicules; (2) places, including the castle, sacred and religious buildings, and environmental markers like ditches, caves, springs, grottoes and quarries; (3) infrastructure, including bridges, mills, calcare (ancient furnaces for the production of lime), furnaces but also wells, snow cellars, fountains and troughs; (4) settlements, including villages, other ruins including huts, moats, archaeological finds and masonry; (5) necropoli, or burial sites.

The point feature centroid represents the exact location of the cultural asset. With respect to inscriptions, if they are on the façade of a building, the centroid is positioned on the wall, if they are on the cross-basement, the focal point is positioned very close to the related cultural asset (the cross), for better map readability.

Intangible cultural assets were divided into the following three categories: tales, traditions, and legends. In this case, the point location takes into account its surrounding undefined and undefinable area.

Linear features were simply obtained by digitizing the catalogue of protected cattle-tracks.

Archaeologically sensitive areas are places where there is a concentration of archaeological sites or records or areas with potential for archaeological resources. Polygons were drawn to define the areas in which the presence of archaeological records may become important for urban development planning programs, and to give useful indications. Their boundaries should not be taken as an absolute edge of the archaeological sites because they can be improved or extended.

For point elements and the archaeologically sensitive areas, the following information was stored: (1) the denomination (in English and in the original language: Italian/local dialect), (2) the toponym or historical name of the place where it is located; (3) the category it belongs to; (4) the type of the c.h., (5) dating (year/century), (6) the constraint that protects it.

All these information are showed in both territory and urban maps and are included in two tables.

3. Results

The C.H.M. of Cancellara shows the palimpsest of witnesses over the centuries, thanks to the 119 features included and showed in the maps related to the territory, and in the map related to the urban centre and the table beside it.

The features of cultural interest inserted in the geo-database and mapped allow different objectives and results to be pursued:

3.1. Protection and management

The results are useful for the protection and management of cultural heritage. They highlight the need to protect cultural assets beyond those currently subjected to archaeological or architectural protection restrictions. The GIS environment where the map was developed, with its flexibility, allows for improvement and additional information regarding the conservation status of each feature, and other important variables. Intervention priorities can also be overlaid with information from different type of risk or planning instruments (such as the Italian Recovery Plan or Civil Protection Plan).

In particular, the map can benefit a municipality by (a) ensuring its c.h. is identified and protected; (b) providing it with a serviceable tool that can be used in order to achieve efficient territorial management and planning; (c) assisting in the development of protection programs with a framework helpful for efficient land use decision making; (d) eliminating some uncertainty or speculation, and reducing unexpected delays and costs; (e) promoting cultural heritage educational opportunities or other community participation initiatives, important for the cultural and economic growth of the community (around cultural identity, tourism, etc.).

3.2. New findings

Many of the sources consulted and the cultural heritage features are shown on the map are still unpublished, so it offers new inputs for other research, but also serve as an important source of knowledge.

3.3. Gaps in knowledge

The C.H.M. offers new fresh insights on Cancellara heritage and its history. For example:

- X-VI century B.C. and V-I B.C. data are all located where archaeological excavations were carried out (such as a site called Serra Coppoli). They are masonry, a moat, the remains of a hut, a burial, and other archaeological findings.
- I-V century A.D. This period is characterized by funerary steles and broken stones with roman inscriptions (II-V), that are located in the old town centre and in its surroundings.
- VI-X century A.D. Traces of the Saint Michael the Archangel cult such as a grotto with a stoup, are identifiable.
- XI-XV century A.D. Many assets dating back this period are located in the old town centre (the castle, churches, the Fiumara bridge and some inscriptions, from the XIV to the XV century), or in its vicinity (the Laurisielo medieval settlement). This historical
period is also identifiable from a number of archaeological findings, including an oven, which could date to a medieval settlement.

- XVI-XX century A.D.: fountains, inscriptions, mills, calcare (ancient furnaces for the production of lime), fountains and inscriptions, an oven, a monumental tree as well as many tales and traditions date back to this period.

In order to support new readings of cultural heritage some simple statistics were calculated and the diachronic reconstruction of the context (Figure 2).

With these statistics, it is possible to highlight that the main components of Cancellara’s cultural heritage take the form of fountains, inscriptions and memories and that there are also a certain number of Caves and Churches/Chapels (Figure 2A, Typology). Most of these are characterised as infrastructure or artefacts, with respect to material features, and as stories for the intangible components (Figure 2(c), Categories). It is also important to note that most elements are not protected by law (Figure 2(d), Type of constraint).

We divided the whole extensive period into different periods, as shown in the diachronic part of the map. In particular, the inset map in the Diachrony area shows all the cultural elements georeferenced and chronologically classified for the whole territory, while the 1:3000 map is an enlargement of the urban centre.

The map highlights the need to investigate further some contexts according to scientific and interdisciplinary methods. It emerged that a significant part of cultural heritage is undated, as it is possible to see from Figure 2 in the Chronological histogram. This is surely a weak point, but at the same time, it provides guidance for future research.

### 3.4. Archaeological contributions

The research enriches knowledge of settlement dynamics and represents the base for a decision support tool to establish priorities for new excavations or field surveys. For Cancellara, archaeological investigations have identified some settlement dynamics and occupancy during Roman and medieval times, grasping some of the differences and similarities with neighbouring coeval sites. For example, the church of St. Caterina di Alessandria deserves to be investigated by archaeological excavations which could reveal a small village (pagus) and a burial ground dating to early Middle Ages (Colella & Settembrino, 2001). In the medieval castle geophysical surveys could detect possible underground cavities. Additional investigations based on field survey and geophysical prospecting could improve the knowledge of a number of sites such as Laurisiello, Piano Carletta and Serra Coppoli.

### 3.5. Informing the public

The map allows the visualization and information of cultural heritage appropriate also for not expert people.
because it records and localizes historical place names, legends and folk memory. While many elements require further investigation, such an exercise reinforces territorial identity.

4. Conclusions and outlook

Data coming from heterogeneous sources were consulted, catalogued and mapped to create a cultural heritage map of Cancellara in Southern Italy presented in this article.

The C.H.M. has value as a research contribution, but also to support management and protection or places and artefacts, and in general to improve knowledge of Cancellara’s heritage. The historical and spatial presentation of these data can guide archaeological investigations in the future.

Management and protection are clearly supported by such tools. For small villages as Cancellara, it is usually impossible to find a framework so current and complete. We also want to emphasize that memory is a window to the cataloguing of local knowledge and part of understanding tangible and intangible assets.

This work lays the foundations for the interpretation of historic landscapes. But of course, it can be improved through the inclusion of many other factors in the spatial database. For example, geo-environmental aspects require additional data; indeed, before interpretation of the historical evolution of the area, we needed to create approximate geochronological units based on archaeological and geo-environmental data corresponding to probabilistic models (Cavazza et al., 2014).

Our methodology can be repeated in other similar contexts of continuous habitation, with the presence of more than one settlement and with a scarcity of archaeological records.

Software

ESRI ArcGIS 9.2 was used to digitize and catalogue the data collected from the different sources. The final layout of the map was prepared in Adobe Illustrator.

The DEM (5m cell size) that is the base layer of the main map, was taken from the Basilicata Geoportal at the following link:

http://rsdi.regione.basilicata.it/Catalogo/srv/ita/search?hl=ita/# . It offers Regional Technical Cartography (CTR) of the Basilicata Region at a scale of 1:5,000

Acknowledgements

The authors thank the reviewers and editors that helped to improve the article.

Disclosure statement

No potential conflict of interest was reported by the authors.

Funding

The authors wish to thank Cancellara Municipality that funded the research.

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