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New studies for the knowledge of the vernacular characters of the ancient water mills in central Sicily

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Abstract

In the centre of Sicily, hidden in a rural landscape that has changed significantly in the last decades, remains the traces of an old economic and productive reality: that of traditional water mills. Even if, often in precarious conservation conditions, these vestiges show an unsuspected resilience. They embody tangible and intangible values worthy of being known, protected, valued, and shared. In this sense, the research that this paper introduces aims to identify and re-read the numerous structures still existing. The purpose is to find effective strategies to safeguard and promote this important vernacular heritage: a silent guardian of uses and customs, traditional methodologies, materials and building systems. All elements that show a wise use of native resources and are the result of functional choices aimed at optimizing production. The paper presents the first results of the study, namely the cataloguing activity carried out in the Gela River valley. The methodology followed relies on innovative systems for online inventory and sharing of the identified properties. The ultimate goal is to create a digital infrastructure capable of also improving the sustainable use of assets scattered throughout the territory.

Keywords: *water mills, restoration, cataloguing, vernacular architecture.*

1. Introduction

Central Sicily presents interesting features for the development of strategies related to the knowledge and conservation of vernacular goods in their significance of the essential elements of the cultural landscape. Here, the process of territorialisation, which over the centuries has caused continuous changes, in close connection with the variations in social, economic and productive conditions, has kept traces of agrarian (pre-industrial) societies. In particular, the research that this paper summarises focuses on the fluvial landscapes of the upper valley of the Gela River. This area extends from the coasts of Gela to the hinterland of Piazza Armerina, well known for the Villa del Casale, a UNESCO world heritage site since 1997. This area has historically been rich in water resources that have shaped its present configuration, as evidenced by the presence of numerous rural buildings and, in particular, several old water mills (Fig. 1). A long-term historical sedimentation testifies to the inseparable link between this territory, the community and the river that has unfortunately been increasingly lost over the past century (Nigrelli & Martelliano, 2018). The study is based on the consciousness that the rural landscape is a dynamic living system and a

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direct expression of the identity and belonging of local human communities (ICOMOS-IFLA, 2017). It is the result of agricultural production, consciously and continually impressed by humans on the natural world (Sereni, 1961).

The study aims at identifying and analysing the processes that transformed it into the current palimpsest, rich in outstanding examples of cultural assets, either tangible (paths, waterways, artefacts) or intangible (trade networks, practical knowledge, traditions, toponyms).

As mentioned earlier, a considerable part of this heritage consists of the remains of rural buildings formerly devoted to production, but which are no longer used. Evocative icons from a past time survive as isolated fragments left to themselves and besieged by nature that takes revenge on what man has built. They are ruins that have their own story and deserve to be understood and preserved.

Very often, these properties lack data about their location and status, physical, material, historical and artistic characteristics, hazard maps and other relevant resources. Information that must be systematically collected and shared to prefigure their safeguarding, monitoring and management as memory sites. Such information also aims to establish the necessary maintenance processes to provide a way to transmit these heritage places to future generations (Letellier, 2007).

The first step of the research on the water mills around Piazza Armerina was the analysis of the inventories already accomplished over the last thirty years by regional and local institutions. These lists were thus combined with the evidence provided by the maps of the Italian Military Geographical Institute (IGM), where some items not mentioned elsewhere were identified. The water mills were then catalogued using the A sheet provided by the Regional Centre for Catalogue and Documentation (CRicd), according to the standards and methodologies established by the Italian Central Institute for Cataloguing and Documentation (ICCD).

Sheet A has become the metadata of a database to understand these historical structures. They have been designed as part of a Web portal created to make the acquired information and materials as accessible as possible. In addition to pursuing the collection and sharing of essential data on these assets with a high identity value, this digital infrastructure has been intended as a tool capable of addressing different types of users. This has been possible through the elaboration and insertion of multimedia content that can communicate both with scholars and people not directly engaged in scientific research. Individuals potentially intrigued or drawn by this heritage are eager to obtain intuitive information and participate in a suggestive and 'subjective' way in the process of interpreting the landscape.

In this sense, the Web platform will also support initiatives aimed at enhancing the cultural itineraries of the territory. It would be managed and/or implemented by associations or institutions, allowing, on the one hand, getting in touch with many potential visitors and, on the other hand, transforming them into both active and responsible content providers and custodians.

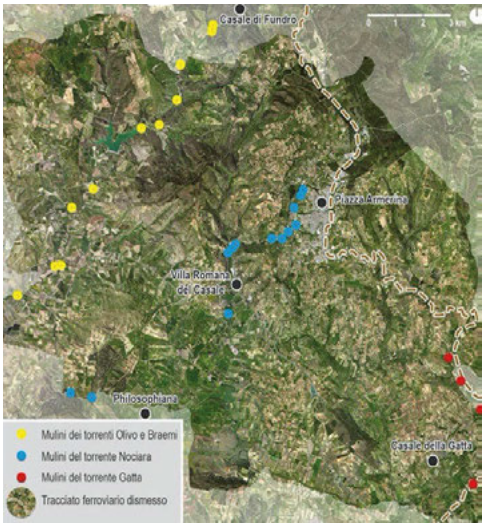

Fig. 1. The water mills around Piazza Armerina. They have been divided into three systems: Olivo and Braemi streams, Nociara stream (first section of the Gela river), Gatta stream.

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As can be seen from the study of ICT platforms for cultural heritage, the real success of these systems lies in a continuous updating designed to keep pace with the sudden changes imposed by technological innovation and the network itself. It is not a finished job; instead, it is a continuous work in progress—both in terms of content and of the IT architecture itself—aimed at improving the efficiency of the institutions involved and the policies for the protection and conservation of our cultural heritage.

2. Methodological aspects of the cataloguing of windmills in Piazza Armerina

The identification of the ruins of the ancient mills in Piazza Armerina was an operation that required patient work. A rigorous methodological approach was followed to cope with the inhomogeneity and the inconsistency of the data found in the already available records.

As noted, this activity began with the consultation and comparison of existing cultural heritage inventories in this area. To this end, the lists compiled to catalogue isolated assets, within the framework of regional and provincial landscape plans (PTPR and PPTP), have been very useful. From the integration of these data, twelve water mills were identified: three of which are located along the Olivo stream (the Rodilosso, Olivo and, Olmo mills), four along the Braemi stream (the two Salemi mills, the Ugliara and Ugliarella mills), four in the Nociara stream (the Sant'Andrea, Cappuccini Vecchi, Berretta and, the Falcone mills) (Fig. 2) and one in the Gatta's stream (Gatta's mill). In the area of Enna, the cataloguing and filing of this heritage had already been carried out in 2003 by the local Superintendence for Cultural and Environmental Heritage, on the occasion of a documentary exhibition related to water myths, rituals, and festivals. The results from this activity were published in small catalogues. This census recorded another specimen: the Rasalgone water mill, located in the homonymous district, along Gatta Creek (Fig. 3). For three of the thirteen water mills identified, the Enna Superintendency also developed detailed fact sheets, which were unfortunately not updated later. The water mills listed on the 1:25000 scale maps of the Military Geographical Institute were added to this initial list. To obtain a picture of the whole area, eight maps from the 1940s to the 1960s were combined.

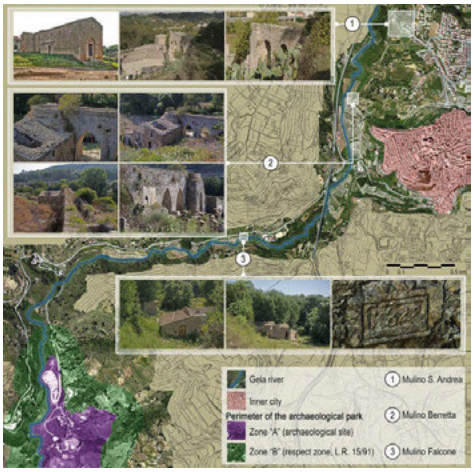

Fig. 2. The section of the Nociara stream that connects the town of Piazza Armerina with the archaeological site of the Villa Romana del Casale.

These maps of the territory showed five additional mills along Nociara Creek. The IGM map also distinguishes the water mills between 'mills' and 'old mills'. This information, compared with the date on which the map was drawn up, has made it possible to discover the plausible period of cessation of the activity of some of these structures (Fig. 4).

The water mill's census was completed with the on-site investigation. The inspections were carried out according to specific routes, identified along the watercourses. This allowed to locate other mills not mentioned before: one north to the Villa del Casale, about 50 metres from the water mill today incorporated by the La Ruota restaurant and another in the Rossignolo district, on the Nociara River, about one kilometre south of the famous archaeological site. Two other mills have also been identified in the neighbourhood of Alzacuda, at the border between the territories of Piazza Armerina and Mazzarino (Fig. 5).

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Fig. 3. The Rasalgone water mill in its current situation.

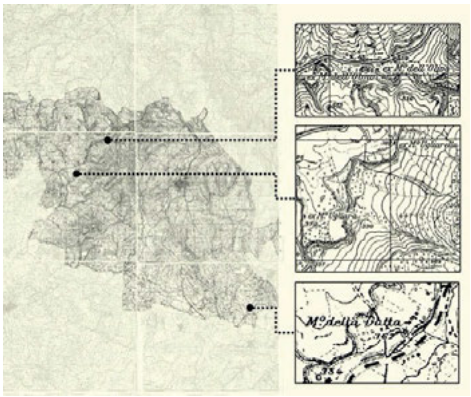

Fig. 4. Map resulting from the combination of the 1: 25000 IGM cartographies consulted. The administrative boundaries of the town of Piazza Armerina and the locations of some mills are highlighted.

In addition to the mills documented around Piazza Armerina, it was considered useful to include in the research also other similar artifacts which, although falling within the boundaries of neighbouring municipalities, constitute significant polarities from the point of view of the process of recovery and re-appropriation of the river landscapes taken under exam.

This group includes four water mills located near the border between Enna and Piazza Armerina, along the Furma stream: the Marletta one and three others attributable to the ancient Casale di Fundrò. Two other specimens are in the territory of Mirabella Imbaccari, intercepted by the river section that leads from the Rasalgone mill to that of the Gatta, respectively called Molino Grande and Molinello. Also, the Quattrova mill has been added to the list. Situated on the border between Piazza Armerina and Barrafranca is a unique example in the area because of the presence of a long twill, still preserved for approximately 800 meters.

3. Recommendations for the recovery of water mills in Piazza Armerina

The inventory carried out has allowed assessment of the conditions of the water mills around Piazza Armerina, mostly reduced to suggestive ruins attacked by vegetation and exposed to climate-related and human-induced hazards.

The archaeological site of Villa Romana del Casale represents the region's most important cultural polarisation and tourist attraction. However, the effective promotion of these scattered assets, which constitute a varied and extensive 'minor' heritage, can certainly fascinate a broad range of visitors. While going to the Sicilian hinterland to visit the UNESCO site, they would be encouraged to stay longer, attracted by itineraries aimed at discovering other vernacular aspects of the territory. The traveller, as in the past, is constantly seeking novelty and difference (Hanson, 2001).

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Fig. 5. Some images of the mill located near the Gole di Ratto, on the border between the territories of Piazza Armerina and Mazzarino and of the one located in the Alzacuda district.

Specifically, in this case study, it was decided to improve as much as possible knowledge about the former mills to make this data available in the future: a scientific and ethical obligation to record for posterity (Stanley-Price, 2009). In this sense, metric and material surveys were carried out by overcoming a series of difficulties related to the accessibility of places thanks to a wide use of new technologies (i.e., drones, image-based 3D modelling, laser scanning, etc.). This activity also had the purpose of documenting absences, recognising gaps and weaknesses due to oblivion and destruction and allowing the residual elements of an integrity that no longer exists to be mapped. A set of signs and voids, still filled with material meanings, knowledge, ideas and symbols left by man and time that should be preserved and made recognisable. To survive, fragile balances need to be preserved 'by making the lived experience visible, establishing dialogues of an equal and assonant nature between instruments of intervention and permanence' (Ugolini, 2010, p. 13). In this sense, to allow authentic substance protection and to avoid distorted site interpretation, the destruction of the original evidence, the disruption of landscape values and the reconstruction of the ruins of the ancient watermills found in this area would be discouraged (as contemplated by international legislation and guidelines). Surveys undertaken have shown an adduction canal - a wall structure like an aqueduct more than 10 m high - which is the only surviving part in the process of 'natural selection' to which these artefacts were subject after their abandonment. For these components, only conservation activities will be allowed to maintain the minimum intervention principle. Keeping the form of a permanent ruin will require continuous monitoring to minimise the scope of necessary treatments. To counteract biological attack activities related to the eradication of plants, weeding and disinfection are foreseen.

To prevent the detachment of wall portions and water infiltrations inside the structure, compensating for the particularly disintegrated mortar joints providing new ones as backward as possible is planned, "as Alois Riegl already advised, to maintain the chiaroscuro effect, the perception of the work that the degradation has done" (Doglioni, 2008, p. 277). For the essential protection of the wall ridges, the use of cocciopesto is recommended to integrate and repair, where still

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present, the original coating layer of the canal that led the water to the mills. This operation must also contribute to making this large channel clearly legible. Approximately 70 cm wide and 90 cm deep, it extends along the entire top of the walls.

For ruins where there are critical problems that compromise the static aspects, it will be necessary to study the possible causes and then take measures to neutralise the effects. Among the causes of failure of these rough details are to be mentioned: the lack of the building that housed the millstones, located at the end of the adduction channel, which compromises the static behaviour, as there is no longer an element of contrast of the forces acting in an orthogonal direction to the canal wall structure; the collapse or ineffective clamping of reinforcing elements, such as the lateral buttresses; and the presence of portions of the wall subject to unforeseen efforts at the time of construction, such as the thrust of the soil accumulated over the years. Once the causes are identified, structural stability measures will be taken. In some cases, they could include the consolidation of the elements preserved (e.g., supplementing the walls, ceilings or roofs in a form based on research results or introducing additional, modern supporting structures). However, the activities aimed at restoring the static behaviour of the masonry should be effective, but visually not very invasive, so as not to compromise their general appearance as a ruin (Jurina, 2006). On the other hand, some water mills have retained an original clear morphology. Their conditions can allow their reuse for different purposes through alternate uses with respect to the original function, also aiming at the economic enhancement of the properties and the territory on which they stand. For example, it cannot be excluded that these old water mills could be reinserted into a productive circle, allowing them to host transformation activities—developed with traditional processing methods—of typical local products, thus safeguarding both the vernacular architecture and the food (Tomaselli & Ciravolo, 2003). In specific cases, small architectural additions would be possible. However, they should be both clearly different from the historic fabric and structure, and the transformations introduced should be 'reversible'. Modern grafting (such as museum rooms or tourist service) will be designed to avoid altering the image of ruins in the landscape and dominating its authentic substance.

4. Digital infrastructure in support of the knowledge and improvement of vernacular architecture

The territory analysed by this research is the result of thousand-year-old stratifications. However, it now suffers from considerable fragility, both due to poor infrastructure and great vulnerability to environmental risks that can even cause permanent loss. The lack of clear perception of these internal areas and the objective difficulties linked to their accessibility make any proposal for enhancement (e.g., through the establishment of paths and itineraries) difficult to implement and maintain.

Some experiments carried out in the past in this direction, thanks to the use of EU funds, have unfortunately turned out to be unsustainable and have failed. Despite this, the relevance of their historical meanings makes it necessary to protect these ancient productive realities, understood as a real resource that represents collective values and cultural production. It is a question of establishing a genuine dialogue between institutions, foundations, landowners, public opinion and genius loci. The objective is to reestablish a direct relationship with the identity of the goods by reworking visual codes and developing graphic vocabularies that can be used to orient, animate and decipher this heritage. It is then necessary to study new hypotheses of valorisation to prevent the forgetting of all the knowledge, traditions, memories and values closely related to this cultural landscape. As shown by the analysis of many other case studies, the most recent dynam-

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ics of cultural heritage management today require a rethinking of the actions to be taken in the field, indicating new ways to follow that can fully exploit the potentialities offered by the ICTs. The collection of data and documents and the production of digital content conducted during archival and bibliographic research has led to the creation of a diversified database that can represent a tool for a holistic approach to knowledge and dissemination. In view of the re-evaluation of these specific community's identity resources, the undoubted effectiveness of sharing the collected data on the network emerges. However, it is crucial to both make a classification and diversify these data to optimise them for a platform that can be useful for different purposes: research, management and valorisation (Paolini et al. 2009). The idea of creating a shared data platform lies at the basis of the research path undertaken, which aims to create a sort of virtual infrastructure for knowledge, technical control, and enhancement. A structure that would allow multilevel access to information, from guided tours for the simple visitor to thematic insights for scholars. Finally, this instrument would ensure the interaction of users, now increasingly involved in the Web-sharing process, to insert new content in dedicated spaces.

To this end, a specific logic and semantic organisational structure has been designed for this platform. The results of the research have been catalogued in specific digital sheets where new fields (metadata) have been integrated to also contain types of data not covered yet, such as drawings in vector graphics formats, hyperlinks to multimedia contents (i.e., virtual tours and 3D models) and virtual reconstructions (Fig. 6). The content of the datasheets created for the water mills in the region of Piazza Armerina was organised using Microsoft Access. The goal was to provide a database that would be implementable on a Web platform and integrated with existing systems, allowing interoperability with both the platforms developed by the Italian Ministry of Culture (MiC) and the Open Data portals based on ArcGIS Hub technology, increasingly requested by the Web users, based on the free sharing of georeferenced databases. For the implementation of the data on the Web, it was necessary to convert the database to structured query language (SQL). It will allow the simultaneous presence of different types of digital data, including virtual 3D models that can be presented in formats currently not contemplated in the ICCD's cataloguing standards for architectural heritage, connected through specific uniform resource locator (URL) paths. It will also be easy to implement and support existing platforms. The latter feature is essential to prevent data redundancy in the desirable perspective of continuous system growth and integration with existing platforms, such as the General Information System for Cataloguing (SIGEC) created by the ICCD or the numerous GIS Web platforms, which for years have become an essential support system for spatial planning tools.

Conclusions

This work attempted to study and highlight the identity meanings contained in traces of an old economic and productive reality: that of the traditional watermills of central Sicily. The research, still ongoing and punctuated by numerous implementation difficulties, aims to develop the knowledge and awareness activities necessary to guide appropriate protection and valorisation actions. In this sense, it has put in place innovative methodologies for data collection, digital representation and sharing as part of operating procedures for the recovery, monitoring and enhancement of these precious cultural assets. The goal is to increase knowledge of the value and precarity of these properties scattered over a fragile territory. It will therefore make use of images and information that should be able to convey the same recognition and evaluation, quantitative and qualitative, of the many elements that contribute to defining their essence. An ambitious project that, in the context of the attention paid to the rural landscape by Italy's national resilience plan, should finally get the attention and support it deserves.

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Fig. 6. Photogrammetric survey of the main adduction channel of the Olivo water mill and virtual reconstruction of the mechanism of a horizontal wheel mill.

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