

Guidelines for the conservation of the ancient hydraulic mills of the Valle Sabbia, Brescia (Italy)

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Abstract

The study of the hydraulic factories (mills, forges, trip hammers, etc.) of the Valle Sabbia, conducted by a University of Brescia research group, within the "Resilient Valleys" project (funded by the Cariplo Foundation), led to the definition of a protocol or guidelines with the ambition of identifying shared and adequate codes of practice to guarantee the correct recovery of this heritage. The object of the survey are artefacts located in functional positions for production activities, today often isolated and not very accessible. The architectural structure and construction features make them particularly vulnerable to deterioration, more so than other types of artefacts. What remains of this building heritage is much closer to the conditions of a ruin which, if recovered or simply maintained, could very effectively convey some of the most characteristic features of local economic history. To conserve and maintain this heritage, operational indications and good practice suggestions are proposed, useful in interventions on buildings and hydraulic artefacts. There is neither a compendium with recipes to follow step by step nor even exemplary models, but rather a critical path method that starts from the direct and physical knowledge of the heritage, to arrive at the timely and most suitable conservation intervention. Method suggestions are proposed, which aim to help the owners, users or managers of these architectures, in choosing, within a scenario of traditional and innovative construction techniques available, the most suitable and correct ones to guarantee respect for the buildings' and hydraulic works' characteristics, their constructive, morphological, technological, material peculiarities and, therefore, to monitor and/or solve problems of decay and instability. Ample space is also dedicated to the planned conservation process, in which enhancement will contribute to respecting the material and intellectual integrity of the ruin.

Keywords: *planner conservation; guidelines; old hydraulic factory.*

1. Introduction

The study of the hydraulic factories of Valle Sabbia (mills, forges, trip hammers, etc.) was conducted by a research group from the University of Brescia, within the "Resilient Valleys" project co-financed by the Cariplo Foundation, Italian banking foundation (Osti Jachia, 2020).

The interest in these remains grew as a result of some insistence from within the area, subject to a progressive depopulation especially by young people with intensified problems relating to

propositive and recognized sociality, assistance and scarcity of human resources. A cause of this human discomfort, common to many marginal areas and poorly served by technological innovation or, if present, little used due to lack of adequate user training, has been identified in the loss of a local identity of the area (Macchi Jánica & Palumbo 2019). In fact, from areas that were the centre of commercial and cultural traffic, they have turned into peripheral and marginal areas, of little or no strategic interest (Borghì, 2017).

Government policy has introduced a new term to identify those peripheral areas or on the outskirts of large urban centres (Barca et al., 2014) identifying them as "inner areas"¹ because they are subject to socio-economic distress strictly linked to their position in the area².

Starting from the first years of establishing the "inner areas strategy", during which we began to study new intervention theories for these areas in crisis with an approach, the growth of an important cultural and operational ferment was observed, placing at the centre of debates just what has long been forgotten (Salvatore & Chiodo, 2017).

Following this approach, the communities of the Valle Trompia and Valle Sabbia, together with numerous public and private partners (Badiani et al., 2019) participated in the "Attivaree" tender by investing human and economic resources with the aim of giving a turning point to the road in which one had let oneself be dragged to start governing one's own area again³.

2. Identifying symbols and places of a community's culture

The research on 17 municipalities adhering to the project (Agnosine, Anfo, Bagolino, Barghe, Bione, Capovalle, Casto, Idro, Lavenone, Mura, Odolo, Pertica Alta, Pertica Bassa, Preseglie, Provaglio Val Sabbia, Treviso Bresciano, Vestone) led to the identification of 126 sites, in urban and suburban areas, with 132 factories indicated in the Land Registers of Lombardy-Veneto and the related hydraulic works. In particular, there are ovens, forges, mills, gualchiere, oil mills, sawmills, bark piles, in various conditions of preservation (some of which have disappeared).

With the desire to restart, and with a view to rediscovering a local identity (Certomà, 2013), looking inside itself, both as a physical area but also as human resources, the Community of Valle

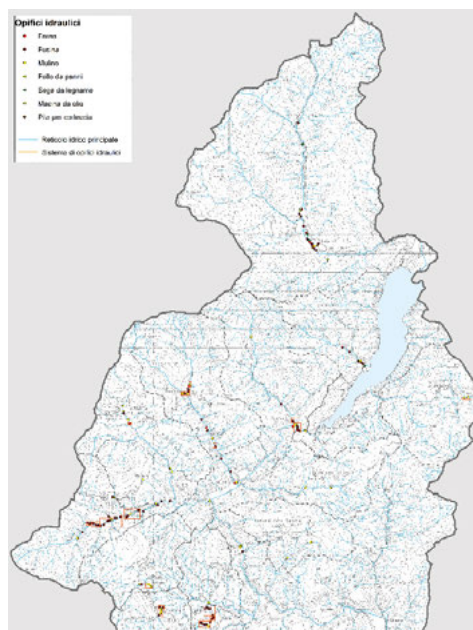


Fig. 1. Valle Sabbia Map: the ancient hydraulic mills.

Sabbia has sought those local values (Scala 2019), which can be translated into cultural and economic resources that could be the driving force for a global territorial recovery (Petrarroia, 2005).

In the choice of symbols on which to leverage, for a cultural rescue and demonstration of the resilience of the area, those architectures were identified that told of a productive history which, in the past, had reached not only all of Italy but also some European countries (Marchesi 2003; Marchesi 2004) making the Valle Sabbia rich and popular.

In light of this, a study was undertaken with the aim of physically identifying the numerous places where the hydraulic factories had been built, recognizing their construction characteristics, the characteristic technological elements and everything that made them unique as recorded in archival documentation (Predali, 1980).

¹ www.miur.gov.it/documents/20182/890263/strategia_nazionale_aree_interne.pdf/d10fc111-65c0-4acd-b253-63efae626b19

² www.agenziacoesione.gov.it/strategia-nazionale-aree-interne/regione-lombardia-aree-interne/

³ [Http://attivaree.fondazionecariplo.it/it/index.html](http://attivaree.fondazionecariplo.it/it/index.html)



Fig. 2. Agosine cadastre map (1810), in brown the forges, in yellow the mills, and in green the textile processing factory.

Observing the land registry maps, it emerged that the hydraulic factories were located in functional positions for production activities, along natural or artificial waterways, carefully constructed, in order to guarantee the continuous supply of hydraulic energy and raw materials for processing (Badiani et al., 2019).

Today these architectures are mainly isolated and not very accessible, in the middle of woods that have regained their spaces (Mancini et al., 2017). The architectural structure and construction features make them particularly vulnerable to deterioration, more than other types of artefacts. In fact, what remains of this building heritage is very close to the conditions of a ruin and, if recovered or simply maintained, could very effectively convey some of the most characteristic features of local economic history (Della Torre, 2017).

The proposed census and material recognition of historical production structures, both buildings and elements of hydraulic systems, constitutes a path through which we wanted to restore a history to the rubble, to those artefacts apparently unable to communicate meanings and values, because they are deprived of the opportunity to become ruins (Augé, 2004).

The identification and attribution of significance of these presences are some of the objectives that we have set out to achieve, so that the apparent rubble can now rise to the role of ruins, suggesting the existence of a timeless past, which binds and identifies with people and companies that have lived in the Valsabbia area (Pitaluga, 2013).

In carrying out this work, we decided to give space to material culture (Scaglioso, 2020), readable in the artefacts, which is expressed both through professional habits, practices and construction skills. Construction materials and techniques make up the physicality of the artefact which, placed in the space-environment, is subject to deterioration (Rudiero, 2013). With this awareness, defining a protocol or lines of intervention that aspire to identify shared and adequate codes of practice to ensure the correct recovery of an architectural complex, is the essential step that the local community should carry out at all levels. If these principles are shared, preliminary knowledge is automatically justified because it is able to offer elements that can be used in the design phase, directing it towards more careful safeguarding and enhancement of the historical peculiarities of the site, providing operational strategies to maintain and increase its cultural value and identity within the area.

The urgency to intervene on this fragile heritage is indisputable (Oteri, 2019), but it does not always go hand in hand with the recognition of the cultural and educational role and function of the materiality of such architectures. In fact, on more than one occasion, it has happened that upon returning to the same site, the structure was found in worse conditions and some portions had already been lost compared to what was present just a few months earlier. By offering suggestions and indications of a practical and conservative nature, we want to encourage readers to take care of these signs on the landscape and of the history of the places, which in some cases, located on the outskirts of highly productive areas, were the embryo of very important industries today, and in other examples located within the woods, constitute a constellation of symbols of sacrifice and the daily work of our ancestors.

3. Guidelines for conservation

The proposed indications, to be effective, need to be conceived within a broad framework, in which a complexity of actions can be taken into

account, set on several levels, able to link the interventions to the surrounding context, to the area and to people (Moioli & Baldioli 2018). The ways of activating collaboration protocols are numerous and varied, starting from simple communication to involving the population; from the search for financial incentives, to the development of joint projects; from the identification of operating conditions, to professional training.

To cope with the danger of losing the asset, staff training also plays a primary role in this sector. By personnel we do not just mean the architect-designer, but a large team of people coordinated by the architect, who cover all the sectors that can interact in order to preserve and appreciate the ruins. In particular, the topographer (who reconstructs the environment within which the asset is located), the archaeologist (capable of giving a sequence and a constructive logic to the parts found and of identifying the sources of historical materials, of the construction and processing techniques), the restorer (who converses dialectically with the architect in understanding the degradation and in assessing the interventions), and the diagnosticians and the contracting company, are fundamental. Based on the data found in the cognitive phase, the aforementioned protagonists can make some more detailed assessments, especially on the issue of vulnerability, not just referred to architecture, but in particular to the site where the ruin is located (Marino, 2019).

Although paradoxically a ruin may be less vulnerable than an entire building, for the factories of the Valle Sabbia an issue not to be overlooked linked to the conditions of the context is the management of the vegetation.

The different types of vegetation present, both shrubby and arboreal, must be identified in advance; choosing specific thinning or cutting treatment; identifying biocides to be applied in a timely manner along the mortar joints based on the vegetation specimens, without compromising the natural balance of the context; specifying the times and ways of applying the treatments;

evaluating a long-term site monitoring and management programme.

In general, the criteria for choosing interventions must follow action timelines. It is necessary to start from a specific assessment of the environmental circumstances, paying attention to materials and construction technologies, and to limit the intervention to the minimum necessary, preferring reversible solutions and facilitating the identification of additions. Therefore, consolidation or additions that alter the appearance of the ruin should be avoided before the results of surveys and diagnostics are available. In case an excavation is necessary to bring to light portions covered by soil or debris, it will be necessary to put in place protections within the entire site, which ensure the balance of the system. Site management is fundamental. The company will not be able to choose materials and operations independently, but to agree on every action with the director of works. It should be emphasized, however, that the indications relating to the interventions alone are not sufficient to guarantee their conservation. Each suggestion illustrated here must be part of a broader framework that aims to harmonize, on several levels, the operational interventions and the context, giving substance to the management of transformations in the daily care that we are called on to exercise.

The conservation process culminates in the start of a planned conservation process, in which the enhancement will contribute to respecting the material and intellectual integrity of the ruin. The archaeological artefact acquires contemporaneity and urges the use of innovative technical solutions during the enhancement process and responds to social and cultural needs ensuring the progress of the site knowledge process.

A protocol has been defined for the conservation and maintenance of this heritage, with the ambition of identifying shared and adequate codes of practice to ensure the proper recovery of this heritage. Operational indications and good practice suggestions are proposed, useful in interventions on building and hydraulic artefacts to guarantee their

conservation. These are methodical advice, which aim to help the owners, users or managers of these architectures, in choosing, within a scenario of available traditional and innovative construction techniques, the most suitable and correct ones to guarantee respect for the character of the buildings and hydraulic works, their constructive, morphological, technological, material peculiarities and, therefore, to monitor and/or solve problems of decay and instability.

The image of the heritage object of our attention, shows how it is mainly made up of structures whose material consistency is largely lost and the ruined character of the property is prevalent. There are several cases of reconversion of buildings, few cases of becoming a museal display and rare those in which the machines are working but no longer productive, but whose owner is available to show the mechanisms to tourists and the curious.

We did not want to propose a technical manual or a code of practice. The latter usually group together standardized technical solutions, which do not adapt well to the constructive complexity and the conditions of conservation of the historical building. The small guide proposed leaves margins of responsibility to those who will have the opportunity to leaf through it, requiring commitment during its interpretation, evaluation and choice of the alternatives proposed. Possible variables with respect to the indications given are not excluded a priori, as long as an approach is encouraged that gives “a problematic dimension to guidelines and decisions” (Torsello, 2000). Neither a compendium with recipes to follow step by step nor exemplary models will be found, but rather a methodical path that starts from the direct and physical knowledge of the heritage, to arrive at the timely and most suitable conservation intervention.

The proposed recommendations do not even replace the commitment of the designer, who remains entrusted with the governance of a complex programme of which the conservation of the architectural material is just one of the elements. Within the text, therefore, one can find ideas, suggestions, contributions that are considered useful to

practically implement the design choices, consistently with the objectives of conservation and enhancement of these artefacts.

In order to make the readers and users of the "guide" feel responsible, it is necessary to share the aims, the procedures and the criteria that led to defining an operation as compatible with the characteristics of the building within this landscape and, therefore, consistent with the intentions of protecting their identity and cultural authenticity. The term compatible is associated with several concepts. Those technologies that respect and integrate the construction system, supporting without replacing it, are considered compatible; that addition which, in the event of loss of an element, intends to integrate it discreetly and confidentially; that daily practice, constantly performed, which maintains the artefacts over time by opposing its final action. Compatible are the "river of minute maintenance and repair works ... [in which] ... we must then know how to place ourselves, with certainly different tools and forms, but tending to a reuse that knows how to combine the reasons of the economy with those of a conscious, respectful culture of the memory and values inherent in the landscape and built heritage” (Musso, 2003). In short, that operation that in a balance of what is lost and what is gained in terms of matter and meaning, always gives a positive result, is compatible.

3.1. Identifying symbols and places of a community's culture

The first part of the guidelines gives ample space to interventions on the ruins which constitute a very large slice of the heritage in question, which in the context of the Valle Sabbia require particular treatment, especially since they are situated in a different and complex context, such as the natural one of the woods. These are activities aimed at the in situ conservation of architectural artefacts, in particular at removing harmful materials and elements that can accelerate the loss of the asset. Useful indications are suggested for the timely making safe of the masonry remains, through the laying of protective layers both at the top of the walls and at the

joints. Lastly, constant maintenance is recommended, starting with the apparently trivial removal of leaves and soil.

The second part proposes interventions for the best preserved buildings, in which it is possible to recognize a wall. Therefore, useful operations are described to act on the various construction elements in a specific way: on structures, roofs, lofts, vaults, floors, openings and windows, mainly supporting their safety and repair, in compliance with the constructive logic.

Finally, the last pages are dedicated to the interventions on the hydraulic and mechanical works, that is the channels, the tanks, the wheels, the trip hammers, etc., still to be found, but often decontextualized and used as garden furniture, or kept inside museums. They generally feature a higher level of degradation than that of the building structures. These works are made of very different materials (wood, stone, iron and reinforced concrete), with complex conservation problems, therefore the intervention criteria that can be provided are general and classifying, based only on the use of the artefact and the materials that constitute the various elements. The intervention must be consistent with the intended use of the artefacts. If the original function is to be restored (or continuity of use, in the rare cases in which the factory is still active, even if only with demonstration functions), it is necessary to intervene on all the hydraulic works, on the wheels and on the machinery, in order to preserve what still exists of the historic plants and integrate damaged or no longer existing parts with compatible techniques, which affect their use. If the museum display of elements of hydraulic works is envisaged, or their conservation as ruins on the site where they are located, both the conservation of existing materials, removing the causes of deterioration, and avoiding remaking the missing parts are fundamental operations, preferably leaving the completion of the work to other instruments, didactic or virtual. Reconstruction by anastylosis of

the elements of the hydraulic energy supply system and of the machines in order to bring them back to their original position, with the aim of having one understand how they work is possible. Lastly, if there is a project for the conservation of the asset with a change of intended use, always if the new function is deemed compatible with the material consistency of the existing one, it is recommended to maximize the conservation of the existing hydraulic works without distorting them. In general, a periodic and scheduled maintenance procedure is required on the channels.



Fig. 3. Melting furnace, Livemmo, Brescia.



Fig. 4. Melting furnace, Livemmo, Brescia, particular.



Fig. 5. Forge, Odolo, Brescia.



Fig. 6. Passerini's mill Casto, Brescia.

4. Conclusions

The consistency and extent of the cultural heritage are such that their timely protection seems to be something that exceeds current economic possibilities. Normally action is only taken to safeguard cultural heritage if serious situations of degradation or instability exist, in the case of the hydraulic factories of Valle Sabbia this situation has already been overcome, i.e. the loss is not imminent but has frequently already occurred. To surpass these situations of perennial emergency, impotence and latent danger of cultural heritage, we believe that the proposed guidelines can constitute an important point of reference from a methodological point of view and, therefore, we hope that they can at most soon be consolidated in the practices of the local commissions responsible for the conservation of the mountain territory.

On the other hand, we believe that the attempt to promote a renewed sensitivity towards such overgrown architectures can support a conservative attitude with a long-term vision (Baldioli,

2011); a willingness to plan activities; a willingness to invest in operations of even poor visibility (sometimes only preparatory to others, sometimes focused on the acquisition of knowledge that is not immediately appreciable); an openness to understanding the importance of continuous attention, of information management (with the consequent willingness to build and feed information systems in which to store new and previous knowledge); a willingness to equip oneself also in the use of digital tools, the only ones capable of managing adequate amounts of data in a collaborative way and over a long period of time, interacting with community maps, to share the new guidelines with all those involved, so that conservation is both unanimous and coordinated: which requires an effective connection between conservation and enhancement practices (Della Torre, 2017).

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