Architecture and nature: maintenance and conservation of mountain architecture

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Abstract

The natural architecture of the Alpine and Prealpine valleys, including that of the small urban centres, follows secular building traditions which, under close study, prove to be particularly connected with the place, its climatic characteristics and its capability to offer resources. Recognising today the foundations of these traditions, strictly linked to the site in terms of location, type, orientation, the relationship between solid and hollow, materials used, building systems and details, direct "dialogue" with the surrounding environment, correct use of the climatic and topological factors, and also of the opportunities the environment offers can make it possible to carry out attentive and consciously environmentally compatible recovery and maintenance works. The paper intends to describe the paths of research set up in this direction, aimed at setting up methodological and operating tools to support maintenance and recovery works on buildings in the Alpine and Prealpine valleys, particularly with reference to the "Alta Val Tanaro" (Piedmont – Italy) heritage, with eco-compatibility and environmental quality control in mind. The straw saddle roof building is the rare distinctive feature of the Alta Val Tanaro heritage. The construction of these tools, in the form of guidelines, procedural and technical standards, etc., is addressed to public operators and to the production and professional sector.
Keywords: mountain and rural architecture, recovery and maintenance works, the Handbook, mountain landscape.

1 Introduction

In general, the mountain landscape represents a delicate system from several different points of view, but in some respects, has remained largely unaffected


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by the work of man. At least since what we would consider recent times - a few decades or so ago - mountain areas have been left untouched by forced development and the energetic or tourist exploitation that have frequently compromised the delicate balance of other ecosystems. Up until then, the relationship between man, his activities and the mountain had been respectful: roads of communication, man-made objects and urban settlements - temporary and permanent - were closely integrated with nature, although this respect was due more to need than intention.

Development of "spontaneous" architecture of the Alpine valleys has followed the centuries-old construction traditions that in one meticulous study, were revealed as being intimately tied to the place, its climatic characteristics and its ability to provide resources. Today, recognizing the foundations of these traditions allows us to carry out maintenance and rehabilitation work that is careful and mindfully compatible with the environmental context.

We believe that conserving the constructed heritage is an important element in a strategic plan of action for protecting the mountain landscape. With this in mind, research has been initiated with a view to developing methodological tools to support the rehabilitation and maintenance work of buildings that typify of the mountain environment, using the Upper Val Tanaro on the border between the Piedmont and Liguria as territorial reference.

2 Constructed mountain heritage

Since the 1930s, the growing interest in the traditional constructed heritage in Italy has promoted a systematic study and constructive analysis of the rural Alpine building industry. Back in the thirties and forties, the architecture section of the *National University Centre of Alpine Studies* promoted a series of systematic studies of the traditional alpine building industry that "through the particularly important historic and developmental phases of research into the statistical and critical investigation," would enable enactment and implementation of "rules and standards with reference to the elements of composition and the still living details of tradition." Today, attention has been turned beyond the study of the typological and historic and developmental nature of the objects, highlighting rather conception and development of correct methodologies for conservation, rehabilitation, and reuse of the constructed buildings, with a view to environmental compatibility in all of its guises.

The mountain settlements have been designed by the mountains and by natural events, in addition to the needs of human lifestyles and his work.

The physical characteristics that come together to form the identity of a traditional mountain settlement are determined mainly by the altitude and the orography of the site. In particular, the orography is a unique physical pattern of a location, with respect to which each type of mountain settlement – urban area, village or remote community – takes on specific configurations for the structure of the system and the morphology of the various parts making it up, in the same way that each site takes on otherwise exceptional and individual characteristics

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by skilfully connecting natural forms of the terrain and artificial forms of the buildings, Mamoli [1].

The need characterizing the tie between man-made objects, the anthropic context and the conformation of the mountain locales has had the effect of moulding itself to construction periods, in relation to the climate, the limited amount of sunlight and the viable roads. Thus, many of the mountain areas at diverse latitudes have become similar, without the barrier of national borders. Even in these recognized general conditions, the mountain landscape demonstrates several local varieties, closely related to the present constructed heritage. Furthermore, it relies on physical, economic and "traditional-psychological" conditions, in addition to political and religious circumstances.

2.1 Local building traditions

The identity of a site is defined by the types of anthropic settlements, in general, and the construction materials and technologies in particular. A number of factors come together in determining variations in the settlement outlines and the form of the buildings and man-made objects. Among these, the uses that the buildings were originally built to fulfil are particularly influential, as is the prevalence and the specificity of the functions carried out, the morphology of the land, in addition to the construction techniques used, closely linked to materials found on site. A fundamental distinction, related to the use of the buildings and the altitude in which they are located, can be made between permanent dwellings, located at lower elevations, and temporary dwellings at the higher elevations used as seasonal refuges for agricultural and shepherding activities. Based on the planimetric guidelines, the structural organization, the original function, the relationship with the land, and the number of floors, in addition to several characterising technological elements, such as the type of roof, the buildings might be classified in accordance with the type of dwelling and the prevailing use, for example, isolated homes, complexes, hamlets, service buildings, etc. - or recurring construction techniques.

Use of local materials for constructing man-made objects and attention paid to the specific characteristics of the site are the main recognizable elements in the traditional relationship between man and nature that have contributed to shaping and defining the Alpine and Prealps landscape. The development of improved means of communication and transportation systems, the rise of new construction techniques and the onset of mass tourism have upset the balance of this relationship, leading residents to abandon many permanent settlements and, concurrently, causing the unchecked formation of new settlements, heedless of the established mores of the relationship between nature and buildings.

A study of the bases of the building traditions of a place entails recognition of the material culture that has produced such traditions and their specific traits. The geometric and non-geometric survey of the existing objects acquires particular importance with reference not only to dwellings or building complexes, but also objects related to human activity, such as wells, furnaces, load-bearing walls, sheep and cattle runs, "*trune*" and anything else that contributes to defining the identity of a site.

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Only recognition of the recurring or specific traits of the traditional man-made objects, which are also closely related to the site, in terms of location, type, orientation, relationship between full and empty spaces, materials used, construction systems and details, "direct dialogue" with the surrounding environment, correct exploitation of climatic and topographic features, in addition to the opportunities that the environment offers, can enable careful and skilful rehabilitative measures that are compatible with the environment.

Figure 1: The “trune” or “selle” for the cheese conservation are a nature and architecture integration example.

The existing constructed heritage in the Alpine space, while connoted by unexceptional and popular characteristics in addition to a fundamental and consolidated element of the landscape, represents a cultural and economic resource to preserve and valorise with a view of more general opportunities to respect the environment and landscape protection policies. Valorisation of the constructed heritage and its traditions become strategic for the protection of the natural mountain landscape.

3 Protection and valorisation of the mountain structures of the upper Val Tanaro

The constructed heritage of the Upper Val Tanaro is the subject of a study entitled "Protection and Valorisation of the Mountain Structures of the Upper Val Tanaro", promoted by the Turin Polytechnic, Mondovì campus, that obtained the recognition and financial support of the Region of Piedmont and the Mountain Community of Upper Val Tanaro.

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The landscape of this region is characterised by highly diverse morphology: starting with the pronounced and impenetrable relief of the upper valley, descending gradually from the sub-Alpine area of the pastures and grasslands, through the various beech and larch woodlands, to the mountain areas with their chestnut groves right down to the vineyards and cultivated fields of the valley floor. The proximity to the sea - the sea is so close that it is visible to the naked eye from many parts of the territory, and not only at the higher elevations - lends this Alpine landscape its extraordinarily individual nature.

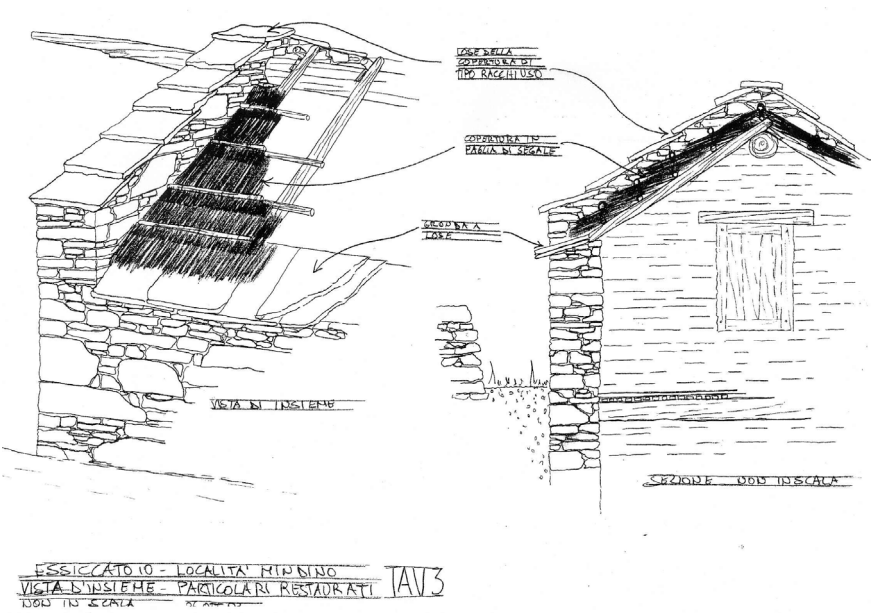

Figure 2: The straw roof of the rural buildings are a strong tie between nature and architecture, landscape and building.

The territory explored in this report is characterised by a constructed heritage in stone masonry with roofs predominantly in straw, to house the ovens and the "drying-room", once used for processing chestnuts. Beyond the specific characteristics of the buildings and the type of roofs, for example, it is interesting to investigate more deeply into what underlies the roots of this technology in the territory. In all probability, the lack of suitable stones to use for the roof canopy (*ciappe*), as well as the local culture, with possible influences from the areas on the other side of the Alps, caused the farmers to cultivate "mountain rye" crops, with its characteristic hollow and durable stalks. The nature of the crop becomes a generator of local construction culture.

From the preliminary studies initiated according to a methodological process developed based on experiences on other lands, we find clear correspondence of the deep relationship that unites the man made objects - architectural and

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otherwise - the material culture that it has produced: it is clear that the deep roots in the area, in the manner of living and cultivating the land, in the manner of using the available materials, with matrices common to other valleys but certainly with strong local characteristics.

After the post World War II period, we witnessed an initial improvement of the living conditions in the Upper Val Tanaro as well as the other Piedmont valleys, by building streets and services, and subsequently to phenomena of abandonment of the mountains and buildings, until the recent discovery of tourism in the inhabited centres. This triggered rehabilitation and renovation work, which were not always careful or compatible with the existing buildings. The even more recent processes of environmental protection and enhancement of the territory impose the need for preliminary studies to direct the rehabilitation and preservation of the constructed heritage. With these objectives, the notion of understanding and studying building structures that make up the constructed heritage of the Upper Val Tanaro and analysing them according to the guidelines and definitions listed above takes on a fundamental role.

3.1 Objectives and research methodology

The research aims to develop methodological and operating instruments to support the rehabilitative measures of the structures of the Alpine valleys, with particular reference to the constructed legacy of the Upper Val Tanaro. Construction of such instruments, in the form of guidelines, procedures and techniques, etc., is designed for use by public operators and the professional and productive sector.

The research methodology is based on the idea of analysing a defined territory to identify the nature of the place, the recurring elements that typify the structure and the surroundings, and delineating the complex relationship that unites it. The valley was deemed the most appropriate territorial type for this type of analysis. It is sufficiently circumscribe to enable investigations on believable and adequately complicated samples and present highly developed case studies. Rural developments of the Alpine valleys, the so-called "spontaneous architecture," also defined by Daniel and Pagano [2] as "indispensable constructions," are actually a tradition of uses, techniques, materials and respect for the environment which these days is regularly betrayed. It is a tradition built up over time by man in facing the natural difficulties posed by the place with the means available and the materials offered by the place.

Starting with research paths already taken and experimented - the main reference follows the methods developed by Ciribini [3] and subsequent formulations to interpreting the constructed terrain and its design - based on an analysis of the structure and its relationship with the environment and conducted on several levels, finalised at recognition of the characterising elements, both with respect to the settlement and with respect to the specific building and technological characteristics and the historic and cultural trajectory that it produced.

A correct and comprehensive analytic route, specific for the man-made objects and their surroundings and the environment with which they interact, can

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facilitate and carry out the rehabilitative works, mindful of and compatible with the environmental context with the support of specific procedures and operations.

4 Nature and structures

On a regional level, in the specific area in question as in other valleys, the settlements frequently show differences depending on human activities and the life of society. Complex clusters of buildings comprised permanent residences at lower elevations and in accessible flatland areas, whereas, settlements dotting the higher elevations where the flocks were moved, were used in the summer months as shelter and at times full-blown housing and areas for processing dairy products. These differences continued on a local and structural level, as well as typological and technological solutions of both types of settlement.

Figure 3: A barn built on an old chestnut tree.

The "permanent" settlement was generally an aggregate set up, with community services such as an oven, frequently with the annexed kitchen gardens. The location took into consideration the exposure of the site to the sun - giving preference to the settlements established on slopes with southern exposure-, wind and natural hazards, such as rockslides, mudslides or floods. Roofs, generally a shanty type with two pitched sides, were largely oriented with the peak perpendicular or parallel to the level curves, depending on the altitude. In the settlements established on slopes, the structures are generally located in a fan shape, on different levels and with a peak parallel to the level curves in order to have the larger side of the house facing south. Contrariwise for higher

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elevation settlements, the structures were oriented in a way to present the peak line perpendicular to the level curves, in a north-south direction in order to expose the small surface of the wall northward and to ensure that snow on the pitched roof would melt uniformly. The direction of the roofs characterised the entire settlement and this made it easy to see which buildings had undergone major rehabilitation and renovation operations in the past.

Scattered settlements were characterised by their distinctive semi-temporariness and were generally located so as to be sheltered during the hot summer and when winds blow. They were frequently built up against the ground and had a roof insulated by section of grassy earth.

Figure 4: Rural architecture straw roof: the chestnut trunk support the ridge-pole.

From a structural perspective, a careful analysis reveals to us the recurring and characterising elements, interpreted in terms of orientation, the relationship with the context, distributive types, technological solutions and use of optimised materials to ensure acceptable solutions of internal liveability. Particularly on

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this level of analysis, recognizing the genesis of the building structure and identification of ethnic, cultural, historic and environmental factors that might have played a decisive role in directing them is essential.

Therefore, recognising the specifics in the relationship with the environment represents an important element to understanding the “reasons” behind the structure and a substantial element to be able to intervene, including with new and appropriate expansions that respect the rules that have characterised the historic evolution of the specific type and using the environmental resources on offer as judiciously as possible.

In terms of structural materials and technologies, methods of investigation delve into the study of various techniques that characterize the structure being investigated, to open up to more information on the cultural reference material, to explore the motivations for the use of specific materials or singular technological solutions and determining the respective characteristics in terms of durability, maintainability, performance of the original system, as well as the degree of energy consumption and production of potentially polluting substances.

This analytical study will make up the basis for planning and using instruments to assist in the rehabilitation process, without excluding the proposal of new materials, replacements, and improvements to prevent elimination of the original arrangement and respect the relationship with the natural landscape and the basic rules proposed by a design based on the application of ecological criteria.

5 Supporting tools to the maintenance and rehabilitation works

Among the possible methodological and operating instruments, the most appropriate one to supporting the maintenance and rehabilitation work of mountain architecture would seem to be the "Handbook." While not pretending to be a full-blown textbook style tool, it provides mainly methodological descriptions and instructions, furnished in the form of guidelines and intervention criteria, to correctly tackle renovation of rural architecture in this territory. In this sense, the technical instructions, while present, would be limited, precisely because the objective of this tool is not to provide technical solutions, but rather, to provide the tools and recommend methods for approaching the interventions. It is presented as a "rule of thumb" not an essential and not mandatory, with a view to stimulating observations and reflection.

Redacting the Handbook to meet the needs of local administration in the region under investigation, as well as sector professionals, is organized by schedules. The schedule is a concise and flexible tool and because it lends itself to integration. On a general level, the Handbook will be organized by topical information relating to the recurring settlement types and morphologies in addition to the recurring morphological and technological solutions by the various construction elements on the other hand.

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The schedules of the Handbook are organized in two large sections: one involves the settlement morphology with descriptive sheets, images, designs and intervention criteria for each; the other is concerned with the structural elements and accessories - doors, walls and external finishes, windows and iron gratings, roofs, external staircases and landings, chimney pots and dormer windows, and ceilings - and includes a description of the recurring solutions, materials, decay, and intervention criteria for each class.

The Handbook is still in the progress of definition. As it has been organized so far, it includes an operating section, applicable to structural elements, with technical sheets on the compatibility of the interventions and with an illustration of some of the typical interventions done. In addition to the methodological indications and compatibility of the interventions, these sheets will include the preventive measures, working methods, preliminary and control operations of the intervention described.

6 Conclusions

The research launched, generally following in line with the consolidated and experimental methodology, through the analysis of the structure made at diverse levels - on a territorial level, on a building level, on a single structural technology level - aims to construct a sufficiently complete and targeted investigative picture of the existing buildings, specifically, to the relationship of the building to the environment, in order to support the possible alternatives of the rehabilitative project. The research aims to identify the development and experimentation on samples of guidelines, of procedural and technical norms, configured in the form of a "Handbook for the maintenance and rehabilitation interventions" that, on the basis of the experience of acquired knowledge, are able to support and direct the design choices from a perspective of respect for the natural and constructed environment perceived in the broadest sense. The main objective of these methodological and technical supporting instruments, beyond an improbable generalization that is not strictly procedural and methodological, consists in contributing to preserving and valorising a cultural heritage that is fast disappearing and its particular documentary proofs, contributing more generally to the protection of the natural mountain territory.

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