

I centri minori... da problema a risorsa

Strategie sostenibili per la valorizzazione del patrimonio edilizio, paesaggistico e culturale nelle aree interne

Small towns... from problem to resource

Sustainable strategies for the valorization of building, landscape and cultural heritage in inland areas

A cura di / edited by
Pierfrancesco Fiore
Emanuela D'Andria



Nuova serie di architettura
FRANCOANGELI



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The published papers, whose contents were declared original by the authors themselves, were subjected to a *double blind peer review process*.

Double blind peer review process

Scholars have been invited to submit researches on theoretical and methodological aspects related to the valorization of small towns in inland areas, and to show real applications and experiences carried out on this topic. Based on double blind peer review, abstracts have been accepted, conditionally accepted or rejected. After this selection, the authors of accepted and conditionally accepted abstracts have been invited to submit the full papers. These have been also double blind peer reviewed and selected for the oral session and publication in the Conference Proceedings by professors and experts of different topics and subjects.

Thanks for cooperation:

Giacomo Di Ruocco, Giuseppe Donnarumma, Carmelo Falce and Anna Landi

All the texts and images have been provided by the authors.

Cover image: Emanuela D'Andria

ISBN 9788891798428

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Presentation

by Pierfrancesco Fiore*

*«To go back to where I was born,
listen to the birds sing again,
wander around the house and garnet and on the fields again,
and between the vegetable gardens and the ancient paths...»*
W. Whitman

The International Conference entitled «Small Towns...from problem to resource. Sustainable strategies for the valorization of building, landscape and cultural heritage in inland areas», held at the Department of Civil Engineering of the University of Salerno, on 19th and 20th September, was a fruitful opportunity for discussion on a topic that has attracted much interest in recent years, that one of abandoning and depopulating of small centers in inland areas.

During the two days of study and presentation of the works, by professors and researchers from Italian and foreign universities, problems related to the aforementioned topic were exposed and, at the same time, multiple proposals and strategies have been shown to hold a phenomenon that is affecting not only many European countries, but also the whole world.

In the last decade, the phenomenon of depopulation and decline of small towns and villages has assumed considerable dimensions, with demographic, social, economic consequences and reflections on the conservation and protection of a wide cultural heritage.

Indeed, we are witnessing an increasingly intense demographic centralization in medium-large cities and metropolises, which, according to the most accredited projections, is destined to increase over the next thirty years.

From what has been highlighted, the problem is extremely complex and presents itself with different dynamics, showing a widespread degradation of the territory and the consequent disappearance of the signs that characterize the landscapes on the small scale.

There are many causes, including the current economic crisis, the geographic isolation typical of depressed regions, the lack of work that forces young people to move away to find a job, the lack of efficient infrastructures and services (education, health, leisure, sport, etc), the changes in lifestyles and consumption patterns that are homologated and conditioned by large commercial brands, etc.

The risk is that the small centers may become places of oblivion, that the characteristics of a secular civilization may be lost and, with them, the identity not only linked to buildings or more generally to artefacts, but also to traces and elements of material and immaterial culture.

The degradation can take over, especially where the ancient system of settlements is preserved, the historical structure of the crops, the organization of rural routes, the original relationship between buildings and territory.

Small centers are, in fact, a precious heritage of cultural identity that must be protected, as is well emphasized in the International Charter of Krakow (2000): *«Each community, by means of its collective memory and consciousness of its past, is responsible for the identification as well as the management of its heritage. Individual elements of this heritage are bearers of many values, which may change in time. The various specific values in the elements characterise the specificity of each heritage. From this process of change, each community develops an awareness and consciousness of a need to look after their own common heritage values».*

In recent years, there is a greater sense of responsibility and interest in dealing with these issues, not only due to the risk of the “desertification” of entire areas, but also for the opportunities that the resources therein can offer, as well as for a more balanced and sustainable territorial demographic distribution.

The attention has increased also due to greater common sensitivity to cultural heritage, landscape, history and environmental quality, all of which can be exploited to encourage investments, tourism and land conservation.

* Conference Chair

That of the valorization of small towns, therefore, is a vast field upon which to base a new idea of conservation and regeneration, producing added value, growth and rebirth in contexts that are undergoing a depopulation process.

For this purpose, the choice of an appropriate intervention strategy is of crucial importance, but requires accurate assessments, since it must guarantee conservation and development at the same time, or rather the safeguarding of tangible and intangible heritage together with economic growth. This strategy should also guarantee prospects for investment and living conditions for those who settle (or re-settle) permanently and aspire to a higher level of services and quality of life, as well as safeguarding the historical structure of the settlements.

The STC2019 Conference was an opportunity to allow participants to make their knowledge available and to present innovative strategies, methods and approaches, in a moment of meeting, reflection and collaboration that saw the participation of professionals from many disciplinary sectors, united to tackle a complex topic, in which every slant has been analyzed, investigated, deepened (from a single point of view, but then compared with other points of view), under the able direction and synthesis capacity of the chairman.

The different and qualified skills have witnessed the strong interest of the scientific world for the proposed topic. Furthermore, the presence of foreign scholars has offered the opportunity to understand the logic and experiences of places that are also distant, but united by a minimum common denominator that can be summarized in the search for actions in order to guarantee growth and development in marginal and depressed places, within the framework of criteria based on sustainability, on the study of change processes, on forecasting future needs, on safeguarding environmental values and protecting and enhancing cultural heritage.

The goal, unanimously declared, is to revive the internal areas, so that the small centers, in the complex panorama of contemporary society, can play a role of revitalizing the territory. From this point of view, the analyzes and ideas received from the authors (strategic studies, analysis models, feasibility studies) will certainly be able to promote its implementation, setting themselves as guidelines for the realization of interventions aimed at revitalizing the built environment, upgrading the infrastructures, reorganizing the territory and, at the same time, recovering identities and cultural heritage.

It is true that these settlements scattered throughout the territory are lacking in services and with few infrastructures, work is scarce (especially for the young generation) and opportunities for meeting and exchange are very limited, but they are also “human places”, where the air is healthier, the discomforts of anthropic concentration are reduced (unlike the city which presents traffic problems, lack of parking spaces, lack of green spaces, etc.), where ancient knowledge and traditions (conserved and handed down for generations) characterize their identity and represent a treasure of knowledge and memories.

In addition, a large part of traditional craftsmanship is concentrated in small urban centres, along with high quality food production, as well as unique natural resources such as mountains, hills, streams, vegetation of every kind and cultivations that characterize the region. All factors that can help unexplored “economies” to develop with high added value, capable of producing well-being and safeguarding the territory, which can guarantee sustainable economic development.

From the research results presented by the authors of interesting papers, it was understood that a trend reversal is prefigurable and that there are all the conditions to hypothesize a repopulation of the internal areas.

However, the debate has shown that we will have to deal with the dynamics of the global economy, with technological revolutions, with the use of machines that will perhaps completely replace man in work, with advanced digitalization; in summary it was reiterated that it is necessary to take into account the dynamics and the speed of changes that characterize our time and the influence that these dynamics may have about the settlements transformations, in the awareness that innovation, as happened in the past, will certainly lead to an evolution of our life models and a repositioning of mankind within his environment in the future. Therefore, we must be ready to manage changes quickly, to understand developments and avoid or at least mitigate any risks that may arise.

Among the conceivable impacts of the resettlement of inland areas, it is possible to imagine the transplant of pre-established housing and/or industrial-type models that have nothing to do with the characteristics or typical features of realities closely linked to the countryside, to craftsmanship, to the spirit of community.

Thus, it is necessary to understand them thoroughly, intimately and profoundly, as Angelo Sofo (2010) states, we must *«put ourselves in a listening situation, try to perceive the invisible behind the visible to get in touch with the essence of that small piece of Earth on which we are called to intervene»*. Regaining marginal areas means putting in place a culture of knowledge that can reveal its history, fragility, potential, even before hypothesizing any actions or interventions.

The loss of the ability to recognize the true nature of a place can, in fact, lead to the uprooting of the individual, the severing of the relationship between man and his environment, through the implementation of economic power that distorts, destroys, erases the traces of time in the name of “progress”.

The studies and cognitive analyses of the Authors of STC2019 are important to avoid this danger that could affect an immense collective heritage: in the process of knowledge, the artefacts (even those that are apparently insignificant) and all the elements related to the sphere of work, craftsmanship, and traditions, occupy a central role, because they are expressions of the local culture, in the context of economic dynamics and of socio-cultural values that have developed and guided human action over the centuries.

To look at the settlements of a given territory in these terms means to consider them products that speak of, and to the people who live and transform them, in continuous interaction with the environment. According to this meaning, the expression “place”, even if used to indicate a portion of space that is materially delimited, actually overcomes the pure spatial and material extension, having its own well-defined character, the so-called *genius loci*.

There are elements of the experience that are grafted into the sphere of traditions, artisan work, subsistence economy, social relations, etc. that strongly characterize the built environment and reveal its meaning; grasping the signs of the meaning of place means *«giving aesthetic value to social facts»* (Mukarovsky, 1971).

It is fundamental to examine, in this sense, the most negligible details, even if apparently insignificant, to analyse the details that seem marginal, which are sometimes revealed as revealing. Even if we want to carefully examine the spatial elements with analytical criteria, we must not forget the *«small discernments»* as Winkelmann said, or identify all the clues which can be traced back to the identity framework of places.

The initiatives aimed at the recovery and valorisation of small towns therefore require an integrated approach with an analysis of the attributable factors, not only of the more technical aspects, but also of those linked to the models of re-habitation, in which space and time have values related to identity, memory and traditions; the place is such *«as inhabited, humanized, recognized, periodically refounded by the people who are part of it or feel part of it» ... «the places are social and cultural constructions, the result of continuous production by the inhabitants»* (Teti, 2017).

The real challenge is to recompose the distance between the humanistic disciplines with the scientific ones, to ensure that the qualitative assessments correspond to quantitative procedures, indicators and analytical methods that can somehow be translated and summarised. According to this approach, it is extremely advisable to submit to the scrutiny of economic verifications because, if, in the evaluation of the interventions the promoter does not detect the conditions to obtain a profit commensurate with the risk, it will not activate the development process that will lead to a successful conclusion of the project.

It is on the basis of the aforementioned considerations that the topics have been developed, to which the Authors have joined with great enthusiasm, presenting interesting papers, and embracing the main purpose of the initiative, or the valorization of small towns, in a general vision linked to the concept of sustainability in its various meanings and definitions, with the clear objective of revealing the potential of marginal places, of seeing the other side of the coin, that of opportunities, of the existence of unexplored resources.

At the end of the two days of the Conference works, it can be said, with absolute conviction, that the small towns, and more generally the inland areas, will be able to have a role of relaunching the territory and, at the same time, will be able to represent new fruition models of the building, landscape and cultural heritage, in line with the demand and needs of current and future lifestyles.

In thanking those who participated and those who contributed in various ways to the organization of the event, I express a greatest gratitude to all the Scientific Committee members, the referees and the Conference organizing staff.

It is certain that the interest in the proposed topic will constitute a starting point for a virtuous process of deepening to the advantage of the most fragile areas, in a historical moment, the current one, characterized by strong contradictions and uncertainties regarding work, environment, cultural and social identity.

Foreword

by *Enrico Sicignano**

Urban development and growth, with large building and housing concentrations in big cities, have led to the collateral effect of the abandonment of small cities and towns, of villages, especially distant and decentralized ones, mainly located in difficult areas from the point of geomorphological view, where good and efficient road, rail, infrastructure, public transport, primary services, etc. are still absent.

From the 1950s onwards, but along a timeline that started two centuries ago, millions of people left their places of origin to move to the big cities in search of work in the manufacturing and tertiary sectors, looking for a better future for themselves and their families.

From a near and remote past but also in the present, migration flows have slowly and constantly occurred and still occur within the same nations, within the same continents and between continents. The outcome of all this is that after decades there is a widespread and consistent building and urban heritage, almost always in difficult, hilly and mountainous areas, made up of small villages and semi-abandoned villages or inhabited by a few dozen families, mainly by elderly people while the younger ones study and work in big cities in the same country or even abroad.

Faced with the new and addressed knowledge imposed by globalization, local heritages also constituted by unwritten knowledge and collective memories seem to have apparently disappeared. These places are sometimes inhospitable and not at all comfortable, while also incompatible with the requirements and needs of modern life.

The city and the country, ancient villages have continuous and multiple architectural barriers such as steep slopes, the presence of stairs everywhere, the objective impossibility of having ramps, elevators, escalators for the elderly and the disabled, the technological systems up to standard and new generation, hygrothermal comfort, parking space under the house ... and everything that can contribute to the so-called “living well-being”, small achievements and goods that no one (above all the elderly and disabled people) intends today to give up. Honestly speaking beyond “not wanting to renounce”, the “not being able to renounce” sometime is imposed.

On the other hand, if this were feasible, it could reinforce that ancient relationship between the people and the places they live in. On the contrary, paradoxically, we are also witnessing a defenseless tearing and breaking of that bond in extraordinary places and cities due to the anthropological mutation of the user.

In this case, the city is not primarily “minor” but “major”, it is neither dead nor moribund but of great artistic, architectural and historical value.

It is the case, but only as an example, of Venice, that over the last decades has become something else, a mega receptive and chaotic urban structure (with hotels, B&B, restaurants, sandwich bars, ice-cream shops, etc.) for a tourist use mainly of mass, in continuous movement, mobile and not stable, not cultural but pseudo cultural certainly superficial, with the presence at times of a single day, sometimes of only a few hours, a “hit and run”, a “throwaway”.

The metaphysical presence of the titanic cruise ships that cross the lagoon every day with thousands and thousands of passengers is also a negative testimony. Not only are they out of scale with the building curtains and the palaces of the Serenissima but they constitute a serious, continuous and imminent danger of potential, possible destruction of the same to the occurrence of even the slightest error of naval maneuver. Italian cinema and literature have also become interested and intertwined with this issue. Two great directors, Luchino Visconti and Ettore Scola have both focused on this topic.

In the film “Rocco and his brothers” of 1960, Luchino Visconti tells about a humble southern family who move from a Southern farm to an industrialized North. Peasant society enters a crisis in a traumatic and dramatic manner when it relates to new, other rhythms and lifestyles, other models, other times, other values of the industrialized and capitalist northern society. The southern family disintegrates, loses its references and its values; it leaves behind a world without conquering a new one. The country of origin, which also means its own identity, is canceled and is irrecoverable.

* *Honorary Chair*

In 1973, Ettore Scola shot the film “Trevico-Torino - Journey into Fiat - Nam” and talked about a young man’s journey from his family’s town in Alta Irpinia, Trevico, to Turin. On this journey, at the beginning and end, the world of life projects, dreams and theirs – in whole or in part – realization, etc... is associated and, on the other hand, the world of affections, memories and the most cherished values (family, friendship, relationship with places, with nature, with people) of the village of origin is associated at the same time.

At various levels, the political, the social, the economic, the cultural, we look at this complex reality in order to analyze it, to study it from the perspective, in the intention and in the hope of making it to reborn to new life.

Small towns, hamlets, abandoned minor centers are part of our past, of our identity and therefore deserve the utmost attention and care. In Calcata, in the province of Viterbo, a unique, unrepeatable experiment was carried out, not replicable in form but certainly to be kept as a reference as a methodology for setting and interventions. We should think of a “new place” in an “ancient place”, which is a place of life, of knowledge, of meetings, of exchanges and where life alternates incessantly day and night. The restoration and building and urban restoration of these places do not mean passive mummification operations, nor to propose false historical projects, nor to offer shameless pseudo-modern interventions that sometimes tamper with, alter, violate places.

It is difficult but not impossible, wise and courageous to take another way, that of belonging to one’s own time and at the same time have respect and consideration for an ancient structure. The complex problem that is focused in the present international conference unwinds itself between the real facts of today and the ancient stories that the stone walls and the “spirit of the place”, the genius loci, if wisely listened to, are able to reveal.

The aim is to re-launch in the space of the territory and of the urban fabric, even the smallest, and over time works and places upon which oblivion and silence had fallen and continue to fall.

The expected result cannot be comparable to that which derives from so many interventions that have focused and invested on the sure economic, social, taste, collective liking that today is so fashionable or that it can only be included among the positive profit transactions or of draws of cold economic budgets. Dealing with the revival of a small village or town belongs to the category of small things that can also be great things at the same time.

It is just a question of magnitudes of value.

«*Architecture already begins when two bricks are joined together by a thin thread of mortar*» stated Mies van der Rohe.

Topic 2

LA CONOSCENZA DEI LUOGHI PER LO SVILUPPO DEL TERRITORIO | THE KNOWLEDGE OF PLACES FOR THE DEVELOPMENT OF THE TERRITORY

Nel quadro delle azioni volte a valorizzare il territorio e gli insediamenti antropici, la conoscenza dei luoghi, dal manufatto architettonico al contesto del paesaggio naturale, svolge un ruolo chiave.

I lavori hanno riguardato analisi, studi, indagini, diagnostica e disegni tecnici del patrimonio storico-artistico e demo-etno-antropologico, degli strati tipologico-costruttivi degli edifici storici, dei materiali, delle tecnologie di costruzione e dei sistemi di costruzione tradizionali, del patrimonio archeologico, delle caratteristiche paesaggistiche, geologiche-geomorfologiche e idrologiche.

Within the framework of actions aimed at enhancing the territory and anthropic settlements, the knowledge of places, from the architectural artefact to the context of the natural landscape, plays a key role.

The works concerned analysis, studies, surveys, diagnostics and technical drawings of the historical-artistic and demo-ethno-anthropological heritage, of the typological-constructive layers of historical buildings, of materials, of construction technologies and of traditional construction systems, of heritage archaeological, landscape, geological-geomorphological and hydrological characteristics.

Symbiosis between architecture and nature. Traditional industrial architecture in small municipalities: hydraulic mills of the “Valle del Esgueva”

by Arancha Espinosa*, M. Rosario del Caz, Enjuto**

Keywords: Industrial architecture. Rural environment. Nature. River. Water heritage.

Topic: 2. The knowledge of places from the building tissue to de natural and landscape context.

Abstract

The work aims to highlight the variable relationship between architecture and nature from the mid-nineteenth century to the present, and do so taking as an object of study the hydraulic mills of rural areas and their supply channels. The 34 mills distributed along the Esgueva river valley (provinces of Valladolid, Palencia and Burgos, Spain) that make up the sample show the changes in the relationship between architecture and nature over time; changes that go from the functional valuation to another one of landscape, cultural and / or ludic character. The communication aims to explore the evolution over time of the hydraulic mills of the mentioned valley, as well as the possibilities of revitalization of the small rural nuclei where they settle, from the valorization of this type of architecture fully integrated in nature, in which architecture, vegetation, water and landscape make up a whole with great potential.

1. Introduction

This article collects some of the partial aspects of the research work corresponding to an ongoing doctoral thesis. Specifically, it deals with the study of a type of local industrial architecture: hydraulic mills. For this congress a concrete aspect that shows an important characteristic of this architecture is studied, its symbiosis with nature. The scope of study is located along the course of the River Esgueva (Basin of the River Duero) and includes 29 small rural municipalities in three provinces (Valladolid, Palencia and Burgos) in the Community of Castilla y León (Spain), observing a common aspect to all of them, the existence of local hydraulic mills that have integrated with the natural environment taking advantage of its resources. The period of study extends from XIXth to the present. This temporary space is the reference that allows us to identify the evolution of this heritage: its origin, mutations over time and even the disappearance of part of it. It allows defining the transformations that have occurred over time in the relationship of this architecture and the medium in which it is located¹.

We have verified in the research three situations in social behavior versus the use of natural resources, in this case the river, in the period of study. A first dependency state; the resources to survive start from the environment; basic needs such as food are covered using natural resources as documented in the XIXth century; these small municipalities had one or more mills that allowed a minimum industrial development, from hydraulic energy, which in turn provided them with basic food resources, either through the sale of the flour or as in other cases the possibility of grind and even make bread in the community oven. At that time, the house covers some basic needs of shelter, but is lacking in services such as: running water, electricity, unthinkable at that time, are the sources, the watering places, the laundries where these services are solved communally.

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¹Articles of the related authors developed in several congresses: Espinosa, Arancha. Del Caz, Rosario (2017 and 2018). <https://idus.us.es/xmlui/handle/11441/69868>

A situation of detachment and abandonment subsequently, results from the industrial development of the early twentieth century; the scientific advances allow to cover the needs that were previously covered by the river; supply pipes reach the house itself, it is not necessary to go with the pitcher to the source, nor wash in the communal laundries or in the same river; the abandonment of young people from rural areas is a common practice; Population statistics² (INE, 1950 a 2018) indicate population decline. This abandonment was not only on the part of the neighbors, there is an institutional one; at the same time, housing policies are established³ to adapt cities to the arrival of workers, usually from the countryside. The local industry, the mills, are not profitable in an economy that sets prices from new factories of national and international supply (overseas possessions), self-consumption is no longer necessary, the improvement of means of transport and communications allow the supply and replace the local industry. The profitable use of the land is the agricultural or the urbanistic one; because of this reason, many of the supply canals of the mills are not necessary and are eliminated, with this the ruin of many mills is inevitable, without the arrival of water until their stones⁴ will be impossible to reopen them.

The reuse of the stone of its walls to build other buildings in the municipalities themselves is more profitable (throughout history the reuse of materials from buildings in ruins or without use has been a common practice). Some of the canals and mills disappear after 1952⁵. Land consolidation affects the main environmental⁶ elements, in this case, the supply canals of the mills that disappear in favor of greater agricultural yield. At this time there is a devastating effect for this heritage, the cleanings of the river (from the Duero Hydrographic Confederation itself) suppress small dams, remains of mills or floodgates, a simple heritage and testimonial that disappears.

The abandonment of the mills, understanding both the building and its canals is a fact; from this moment the evolution of the mills has different destinations: some cases lead from abandonment to ruin, although also, in others, there is minimal maintenance, in the best of cases it becomes a recreational space within a natural environment. The ruined buildings begin to be invaded by vegetation; maintaining, in some cases, the trees that once accompanied the mill, identifying it.

In a third moment, at present, XXIst century, it is not possible to have all the original heritage having located, of the 36 mills identified in historical⁷ documents, only 18, and of them, only two that, maintain their useful machinery, which they have been transformed into small power plants that take advantage of the water with new turbines and brought electricity, for the first time, to several rural municipalities. The vegetation is one of the signs that allows to identify, at present, its location. In the cases of reuse of these spaces, environmental assessment is a constant as a playful and cultural element. The research highlights that the identified mills and their environments maintain attractive natural conditions for recreation.

2. Brief notes on the geographical space where the mills are located

The study includes an interprovincial framework. It covers three provinces: Valladolid, Palencia and Burgos. Of these, the municipalities that have in common, belong to a valley, the valley of the river Esgueva are selected.

The course of a river is used as a sample for research because it is considered a significant space for analysis. We understand that, in particular, the mills (one of the main water architectures) serve to exemplify this evolution of the relationship between the river and the way of inhabiting. This communication will focus on them, specifically on the supply canals.

The valley of study has, as origin, the erosion of a river, that finally is formalized in a long and little flowing river; with a variable seasonal flow that makes it a natural element that determines other aspects of life in its environment.

²INE. Statistics National Institute. Population tables. <https://www.ine.es/>

³Cheap house policy: Laws of Cheap Houses of 1911 and 1921; Salmon Law of 1935. Protected housing laws. (Law of 1939) Housing plans of development policy (National Plan 1956–1960 and Plan 1961–1976). Developed in the doctoral thesis Juan Van-Halen Rodríguez. <https://dialnet.unirioja.es/servlet/autor?codigo=3691982>

⁴Stone: part of the mill that by the transformation of the movement of water into energy grinds the wheat producing flour.

⁵First provision on land consolidation: December 20, 1952.

⁶Alenza García, Jose Francisco. (1999). Article: "Evaluation of environmental impact and land consolidation".

⁷Madoz, Pascual. (1845–1850). "Geographical, Statistical and Historical Dictionary of Spain and its Overseas Possessions". Hydrographic Division of Valladolid. (1878). "Itinerary of the Esgueva River". *CHD. Fondo Histórico(1878). Caja 10.*

These water features will configure local aspects, such as the widespread existence of a type of linked industrial architecture, hydraulic mills, facilities for the production of flour: flour mill, or of fabrics, mill-cum-mill. The river Esgueva provided the valley with the necessary means of subsistence at one time. The knowledge of its natural characteristics allowed to interrelate with the water: it is stored, energy is produced, the energy is regulated by changes of height in the artificial channels or the water is retained as a forecast in case of low flow;

It is also useful as fish retention for feeding in fisheries⁸ or irrigation of orchards. The human being and nature interact, there is a symbiosis between them. Water is a not scarce commodity in this valley; the geographical proportions cause the runoffs to flood the valley, which presents a numerous and rich repertoire of sources (Fig. 1) or wells; also laundries and troughs that take advantage of streams; wells that use groundwater or streams and channels that the human being has articulated to mold the course to their needs. The abundance of water allows the valley to be rich in vegetation and fauna. The river is perceived, visually, as an axis of vegetation to which canals accompany; it is the nature itself that allows us to identify, in some cases, mills or fountains, by generating a more intense vegetation in its environment.



Fig. 1 – 1.Mill, dry outlet canal (Socaz) .Villatuelda. Burgos. 2. Old source. Redefined at 1,703. Valdeande. Burgos. 3. Landscape with entrance canal (Caz) to mill. Villovela Burgos. 4. Landscape with Mill Exit canal (Socaz). Power Plant Mill. Castrillo of Don Juan. Palencia 5. Roman Fountain S. I/II. Villatuelda Burgos

The municipalities that form the Valle del Esgueva have common characteristics, the main one, which is a valley rich in water and, therefore, in architecture in relation to it; history allows us to confirm that water and architecture have been present for more than 2,000 years. Among the most significant features of the Valle del Esgueva, are the following: small rural areas separated by short distances that allow communication on foot between them, following the course of the river (150 km of route by road) and its adaptation to the geographical space, which gives great harmony to the whole. In addition, all these small cores have matching building typologies and present a balance relationship with the natural environment, even when there has been a decided intervention in it. There are aspects in the genesis of each municipality that mark different singularities: connection to the same feudal Lord; Location at the foot of a Castle or around a monastery⁹; the opportunity of a crossroads; or existence of villages that served seigniorial lands. At present, these diverse circumstances of departure are those that favor the variety of morphologies and their patrimonial wealth, particular in each case.

Among the buildings, which are a constant in each municipality, are: the church or churches (usually rural Romanesque made by related brotherhoods), hermitages, one or two hydraulic mills (flour or fulling-mill); to which an urban plot is added and adapted to the terrain, as well as the presence of the river, and / or streams and canals that run alongside it. Fountains, drinking troughs, wells and, mainly, the hydraulic mills and their canals, make up the main water architecture in the valley. This article analyzes the relationship between canals and the medium, since between them an intense and singular symbiosis is established. The natural canals, the streams, or the artificial canals of entrance, "caz", and exit of the water of the mill, "socaz", as well as the rest of auxiliary

⁸ Fishery. Space that retains river water, including fish, within the course of the river for its use.

⁹Bango, Isidro. (1990). The Medieval monastery. The monasteries had an important knowledge regarding the use of water. From the 6th to the 7th centuries, different Monastic Hispanogodas orders lived according to some regulatory norms that included aspects of the organization of their monasteries. They built next to a river; they took advantage of this circumstance to obtain water for cleaning and organization, close to the refectory and the kitchen; Some cases included mill. In the field of study, Tórtoles de Esgueva, a Monastery is located that proves it: Santa María la Real. S.XII. Romanesque. Built around a spring.

elements around this architectonic set (dams, fishery, floodgates, ...) they show that singular and constant symbiosis with nature.

3. The hydraulic mills of the Esgueva Valley

3.1. Starting situation

The investigation is based on two historical documents that give a report of the situation of the mills in the 19th century. It is the “Geographic Dictionary” of Pascual Madoz and the “Esgueva River Itinerary” carried out by the Valladolid Hydrographic Division. The first describes, in a novel way for the time, almost statistical, the situation of the totality of municipalities of Spain and overseas possessions; this documentation has been classified, in the investigation, in index cards. The second document “The Itinerary of the River Esgueva”, describes kilometer by kilometer, the actions on the river, therefore all the municipalities of the study; also, the mills are numbered, their characteristics are defined and they are located at the kilometer point where each element is found. The previous cards are completed with these new data. The comparison between both documents allowed us to be able to compare with later situations, the state of all the mills and their components.

It also allowed to ratify the evolution over time; when comparing both documents it is verified that, except for some data, they are very coincident and rigorous; Thanks to that, at present, we have been able to verify the location and we have a certainty about the evolution of the local industrial architecture object of study.

From both documents we obtain important data about the mills: a numbering, its power, its channels, points of attack, its overflow canals, its steps: an information that allows, even, to locate them; Also, elements in ruin, are described, which indicates that there were more mills or that they were renewed. From this analysis we obtain the data of the existence of 34 mills, as well as their location along the course of the river. It also describes if they are private (the name of the owner is indicated) or community. An important information when visits are made later, because it allows to understand the reason, among others, that in the upper part of the river, the abrupt geography and the more complex communications favor the existence of neighborhood mills. The communal mill is simpler, it serves the users to grind their own flour, even, in some cases, they are bakeries, they have an oven (now the ovens have disappeared). The economy of the environment also influences the type of use of the mill; In the upper part of the course of the river, livestock is becoming more and more interesting in the face of agriculture, which makes it possible to understand the existence of a mill (wool transformation) more related to the production of textiles and the production of cloths in nearby weavers¹⁰ (also described in historical documents).

3.2. Current situation

In the field trips, in the last three years, 18 mills have been identified throughout the course of the river by visual means, although possibly other archaeological techniques would enable the identification of more remains.

The images (Fig. 2) reflect the result of the comparative analysis of the existing mills in XIXth century and those identified in XXIst century. Analysis from the upper part of the river to its mouth in the city of Valladolid.

In the visits a situation that attracts our interest is observed: the natural environment is still significant, even in the cases of ruin and abandonment of the architectural complexes that compose the mill. The water canals of access and exit to the mill have been eliminated or canceled in many cases, even so, the proximity of the river offers a natural environment rich in vegetation and both surface and underground water (springs and water sources). It is observed that the identified mills maintain attractive natural conditions for recreation; some canals are maintained with use for irrigation of orchards in the upper part of the river; the spaces have been linked to recreation areas, as in some cases in the lower and middle part of the river. It is observed, that the attractiveness of these groups, at this moment, is ludic: for the presence of parks, recreational houses or areas linked to leisure.

¹⁰Madoz, Pascual. Describes the existence of weavers; also, the existence of a fulling-mill linked to a monastery, this researcher relates it to the one located next to the monasterior in Tortoles de Esgueva. Burgos.

The cases in which the mill maintained its use, such as those transformed into generators of electrical energy, by replacing the stone with turbines, maintain the set of canals; as also those that use water as irrigation for vegetable gardens. The disappearance of use has been the biggest reason for abandonment. The evolution of the state of these heritage elements deduced from the analysis, indicates a tendency to disappear, pointing out the surveys made a lack of knowledge about one's heritage and its location.

With the data of the visits, the state of conservation of each case has been analyzed. What cases are in good condition and what uses have influenced the best preserved cases has been a line of research. It is observed that the best preserved are those that have endowed the mill and one-way canals, the power plants, which we find in two cases. Also, those who have linked their use with a recreational use, even if it is occasional, as a summer house. It is observed in the image (Fig. 3) the 18 mills located at present, including those that are in use, those that are unused but in good condition and those that are closed or in ruins. The rest has disappeared.

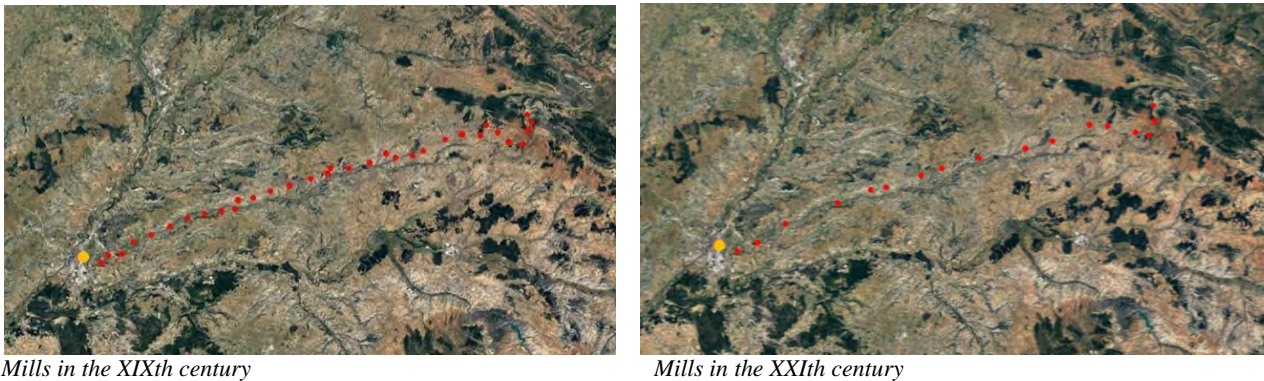


Fig. 2 – Interprovincial field. Three provinces. Comparative image of the location of mills in the XIXth century and nowadays XXIst century 18 of the 34 mills described Historically have been located. Source: Own elaboration based on Google Earth image. Eye height 114 Km.



Fig. 3 –Current status of the mills located along the entire course of the River Esgueva. Reading of images according to the sense of the course: from left to right and from top to bottom. Black and white mills in danger of disappearing by their state. Author source AEG. – Source: photo of the authors

Of the located ones (Fig. 3) two are in use and with the complete machinery (stone wheel and electric turbines¹¹) used as power plant (N°2 and N°8). Maintaining a use over time has meant its full maintenance, they were productive. Some others, used or incorporated in parks have a conservation although its state is dilapidated (N°1, N°3, N°6, N°9, N°10, N°11, N°12, N°13, N°15 and N°18). The rest are a ruin with apparent abandonment and its poor state, progressive, can eventually make it disappear (N°4, N°5, N°7, N°14, N°16 and N°17).

This study shows that of the mills described in the 19th century, 47% of the heritage has disappeared (16); among the localized ones (18), only 11% is kept in its entirety (2), 55% has an integrated use that allows its maintenance (10) and 33% is in a degenerative process tending to disappear (6).

What we can observe, also, in the image (Fig. 3) is how in all cases, in spite of the loss of fundamental elements and constructive deterioration, an attractive location in the environment is maintained with a unique image of the building element; still in ruins, there is a very powerful and identifying geometry. Vegetation and trees are a constant, either being an abandoned building or an in use one. The recovered buildings have in common that they are linked to this relationship with nature, being spaces for recreation and leisure that put the building in connection with the environment. Water, even in the case of the disappearance of canals, is present; A relationship close to the river creates an unusual place in the Castilian plateau, a space with environmental and plant characteristics more similar to a landscape closer to the mountain as far as vegetation is concerned.

4. Architecture and nature: analysis of the supply canals of the mills

After the study, one aspect is remarkable: the symbiosis between architecture and nature in these spaces. A mill is a device that brings together a historical technological knowledge, which the human being has created and with which he interacts with nature, obtaining some benefits: producing energy for industrial use. The canals divert the water for use in the mill and, after producing energy, it is evacuated, returning to the original channel.

Once the water has been diverted, the working power can be increased through two components: achieving the highest jump height of the water and the greatest possible length of the canal. Not in vain, the descriptions given in the documents of XIXth century describe the working height¹² of each mill being, between more than one meter in the flattest part to more than 4 meters in the upper part of the course, according to geography and different elements designed in each case or the runoff used.

A series of strategically placed gates and manual action, allow to manage the necessary changes at every moment. This is: they allow to close the entrance of water, to keep the water in reserve, at least, to grind what is necessary in a working¹³ day or to let the water run if, due to the meteorological agents, the water is abundant.

Besides the main use, energy production, this building set allows other uses: to irrigate orchards or accumulate fish for own consumption in the fishery; therefore, several activities related to subsistence are developed in the mill. We have been able to verify that, when the mill loses its use completely, it physically ruins the whole: building, gates, fishery, ... It will be the disappearance of the canals, especially in the lower part of the river, where the width of the valley is larger and flatter, suitable for agriculture, where they are eliminated more frequently, because of land consolidation, (which combines farms for greater agricultural use). In this case, some of the course mills are definitely lost. We keep its reference only through historical documents or signs “in situ” as small steps that are still under the roads or, even, by the trees and vegetation¹⁴.

This research has specifically inquired about “canals”, main elements in the operation of the mill and, however, not so striking or attended in existing studies; its state and the vegetation of its environment indicate environmental factors of interest. We have made an analysis of its current status. For this, specific characteristics have been detected in three differentiated sections. In the upper part of the river, which is more abrupt, a narrower

¹¹Electric turbines System that replaced the traditional energy production by electrical. These mechanisms allowed for the first time to bring electricity, light, to rural homes.

¹²Hydrographic Division of Valladolid. (1878). “Itinerary of the Esgueva River”. CHD. Fondo Histórico(1878). Caja 10.

¹³Interview and video recording of the same to D. Manuel García Tocino. Miller. Date: March 16, 2018. Provides data on the work at the San Muñoz mill in Salamanca.

¹⁴It is common for mills, fountains or laundries to be found in spaces with vegetation and trees. Water and humidity facilitate it; Once the building disappeared, the trees identify a possible location. This has allowed us to identify in the field work some ruin as the case of the mill n°32 “del Olmo”, in Esguevillas de Esgueva. Remains of the mill were found next to the trees. Also the names of the roads, streets or places allow to identify past uses.

and steeper valley space, the use of natural runoff waters¹⁵. is common. In the middle part of the river course, where the valley is still narrow, although with less slope, and where the canals, natural in some cases, may have shorter stretches and very close to the river, the space available between them (river and canal) is scarce and in the orchards are the protagonists, which justifies the current maintenance for the irrigation of such orchards.

The lower part of the river, where the valley is more open and flat, with less slope and more prone to land use for agricultural uses, specifically for cereal plantation, the canals have disappeared. We analyze below, more in detail some of the cases, ordered from the upper part to the lower part of the river.

4.1 Analysis of the supply canals of the mill in the upper part of the river

From the upper part, Peña Tejada (1,414 m), passing through different springs and water sources, frequent, we arrive at a first municipality Briongos, located at a height close to 1,100 m. In this section, access between municipalities is complex, it is not linear; we are next to Fuentes de Casares, a set of springs that will give rise to the river, at the foot of the Sierra de la Demanda. In this case, the mill collects water from streams and run-off directly, depends on seasonal use, so in a few months the mill will remain closed. Livestock here is more relevant than agriculture; the streams and creeks join directly with the mill. In their majority, they are community or neighborhood mills, used by turns. The most abundant vegetation is grouped along the runoff.



Fig. 4 – High zone of the River, at the foot of the Sierra de la Demanda. Birth of the river, near Fuentes de Casares. Mill N 18 Briongos. Burgos. An important runoff goes through the mill, from the union of them the river will form. In this are located two mills, one of them not found. Located in the highest area. One currently with housing use – Source: Google Earth. Eye height 817/209 Km.

4.2 Analysis of the supply canals of the Mill in the middle part of the river.

In the middle part of the river, the urban centers are, mainly, in the hillside; According to the neighbors themselves, usable land is used for agriculture and the villages are located where less amount of land suitable for cultivation is lost. In these cases, and given that the course of the river is very superficial, streams and canals are observed in parallel to the river bed, which collects different streams from the slopes and steep slopes. Sources appear, locating several of Roman time, and medieval ones of interest. As justified by Roman remains, such Ciella or Clunia¹⁶. The ease and proximity of the canals allows, in addition to the operation of the mill, the appearance of vegetable gardens and small esplanades for agriculture; The river still has a slope and important vegetation that is currently maintained around it, even if it is in ruins.

¹⁵ Runoff. Stream of rainwater that circulates on the surface of the earth, can give rise to occasional or seasonal streams.

¹⁶The Roman culture was aware of the multiple uses of water. The remains of this culture are located: from springs, hot springs as described in the village of Ciella. Therefore, in the environment the relationship between architecture, water and nature as belonging to the cultural tradition is identified.

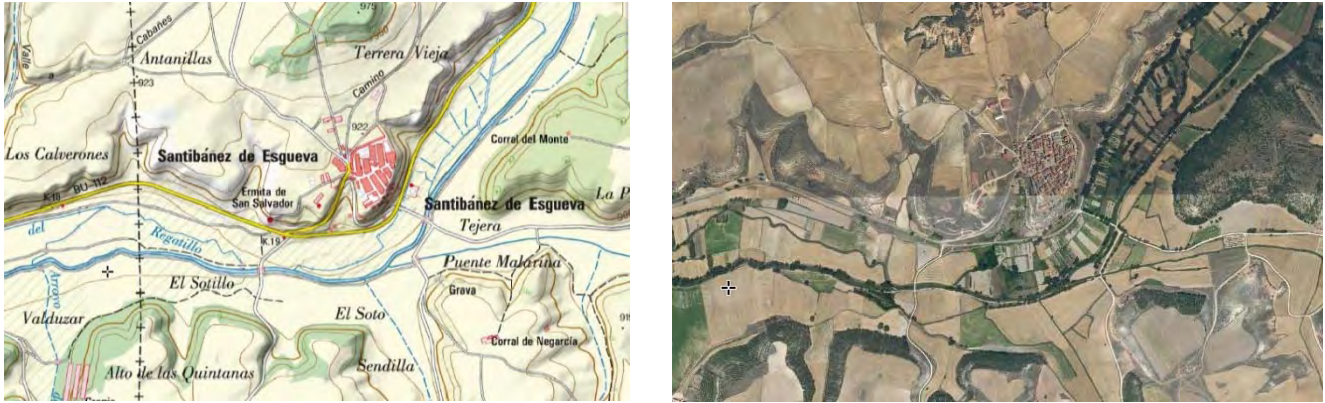


Fig. 5 – Middle part of the river. If you observe how the valley is becoming wider; the streams and canals allow the irrigation of orchards. The canals configure vegetation lines in the landscape – Source: IGN Source. Viewer iberpix2. Map 1: 25,000 ETRS89. V.4.5.5.PNOA image.

4.3 Analysis of the mill supply canals in the lower part of the river

The lower part presents an increasingly open and wide space, coinciding with the meeting of two valleys: the valley of the River Esgueva and the Valley of the River Pisuegra. The union of both valleys propitiates wide extensions very useful for agricultural uses, with rich soils by the overflowing of the rivers since the river is very superficial and overflows seasonally. This circumstance causes a rich soil for agriculture. Already Madoz (1875)¹⁷ described the soil as one of the best in the country. The railroad, the imported products, bring down the market of the local product, and therefore motivated the closing of the mills; only those that were transformed into electricity producers are maintained. The rest disappears or is closed. The canals also disappear, in favor of more space for agriculture, which is more profitable.



Fig. 6 – Low area of the river. Molino de Castronuevo de Esgueva. Electric station. No. 2. On the left, planimetry seen from the set; on the right, detail of the mill and its channel – Source: IGN flat font. MNT25. Viewer iberpix2. Map 1: 25,000 ETRS89. V.4.5.5.PNOA image

As a summary, it should be noted that several parameters have affected the evolution of the state of the canals.

On one side, the profitability of the land in other uses and the loss of use of the mill itself. The current reuse of some of these sets is related, in 100% of the cases, to the playful use of the natural spaces next to the mills; its proximity to the urban centers allows walks and recreational areas in an environmentally rich and landscapingly attractive environment.

¹⁷MADOZ, Pascual. Opus cit., P.60. Esgueva term: r.

As a singular case, it is worth mentioning the mouth of the river Esgueva in the river Pisuerga in Valladolid, the only city of the route, a purely urban space, in opposition to all the others analyzed, with a marked rural character. It is observed that the natural layout of the Esgueva river has been completely lost, since it was buried and diverted between the second half of. XIXth and early XXth century. There are several studies (pending publication) on the different bridges and remains hidden under the streets.



Fig. 7 – Mouth of the Rio Esgueva through a city Valladolid. Several branches crossed the city. Topographic map 1833. It is difficult to distinguish its original layout – Source: IGN Viewer iberpix2.Image PNOA.

Brief description of the state of the 18 mills located in the course of the Esgueva River:

Tab.1 – Table of state of the 18 mills located today along the course of the river.

Identified mills	Short description	Identified mills	Short description
Province of Valladolid. Mills of the province. 7 are described	River mouth. City of Valladolid. The natural river has disappeared.	Province of Burgos. Mills of the province. 10 are described	Birth of the river
1 Renedo de Esgueva.	“Molino de Castro”. Ruin inside a theme park. Current use of the park. Playful	9 Tórtoles de Esgueva.	Mill next to Monastery. Runoff type. By historical texts it could be a Batán.
2 Castronuevo de Esgueva.	Fabrica “Finca la fe”. Power plant. Mill preserved with machinery. Rural hotel	10 Tórtoles de Esgueva.	Down mill. It maintains canals. In rehabilitation. .
3 Olmos de Esgueva.	Building for sale. The interior modified in bar.	11 Torresandino	Mill above. The building is preserved. The channels no.
4 Piña de Esgueva.	Building in Ruin. Unused canals are identified.	12 Torresandino	Down mill. It has been transformed into a private play building. Originally had an oven and bakery
5 Esguevillas de Esgueva.	Residues are identified. Ruin. Missing canals are identified some steps under roads.	13 Villatuelda	The building is preserved. The canals are canceled. The raft is maintained
6. Villaco de Esgueva.	Mill in ruin. Family heritage without use	14 Terradillos de Esgueva.	Building in ruin
7 Canillas de Esgueva.	In ruin.	15 Cabañes de Esgueva.	Simple communal mill; rent for hours. Leisure area; irrigation of orchards.
Palencia. 1 are described	It goes through a single rural municipality	16 Bahabón de Esgueva.	Renedo mill Building in ruin with recognizable structure of canals
8 Castrillo de Don Juan	Conde de Orgaz Mill. Conserved. Center of electrical transformation. Summer house.	17 Pinilla Trasmonte	In ruin. The canals are not identified.
		18 Briongos	It has two mills. One of them visited and another not identified. Currently housing.

Conclusions

The investigation of interprovincial scope collects local patrimony of 29 municipalities united by a river.

Except for some exceptions, this heritage is not linked to cultural itineraries, it is unknown. The investigation shows that at present the local municipal heritage of hydraulic mills is gradually disappearing. A focus of interest is observed on them and this is directly related to one of their characteristics, that is the appreciation of the symbiosis between the building itself and the nature that surrounds it. The playful use, which values the whole: building, canals and nature, is at the moment the tendency that is observed in 100% of the buildings recovered.

This is the case of Renedo de Esgueva, where the remains are included in a center of recreation, or the case of the Fe farm, in Castronuevo de Esgueva, where a rural house has been built that uses the platforms between the trees as meeting and leisure elements; or the interpretation center that is intended to be made in Tórtoles, among others. The rest of cases are in ruin or closed. The study, having verified the tendency to the disappearance of an important part of this heritage, proposes paying attention to three aspects, in order to stop the disappearance trend and promote the integral recovery of the groups. These are: the need to identify the heritage and its scientific dissemination, because only by making known the existing heritage can be taken into consideration. On the other hand, encourage the incorporation, within existing itineraries and natural roads, of elements of signaling and identification of these sets, in order to strengthen a network of itineraries as a space for environmental education that enhances conservation, together, of the environmental element. And finally, since the proposals, generally, start from private initiatives, given that the administrative processes are complex, it is proposed to make the administrative procedures more flexible in order to value the heritage in danger of extinction, since they would entail the revitalization of the small rural centers where the performance is located. It would also be of interest to link the tour of this heritage with other types of cultural activities that can enrich their knowledge in a transversal way, which is part of the cultural heritage of each municipality in rural areas. It is proposed to use these spaces as an educational system on the environment. The recognition and enhancement of the industrial heritage of small municipalities, highlighting those that have been reused, can encourage the use of the rest, especially those that are abandoned. The recognition is occurring spontaneous, by social initiative, and is associated with the whole consisting of: the mill, its canals and vegetation, in short, environmental enjoyment: architecture and nature.

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