

THE HYDRAULIC MILLS IN THE MOUNTAIN COMMUNITY ITALO-ARBËRËSHE OF THE POLLINO

0. INTRODUCTION

In this volume converge the data results from a research to reconstruct the network of water mills, developed in the work of study and research conducted by the Mountain Community Italo-Arbërëshe of the Pollino and activities promoted under the project NetWet 3 - New forms of territorial governance for the promotion of landscape policies in the field of water resources management at water territories - funded by the INTERREG-ARCHIMED. The survey, which has as its ultimate goal the cataloging of many mills plumbers, their protection, preservation, conservation and enjoyment, is divided into four parts:

- The social and technological Italian and European level
- The regional context and characteristics of plants of Calabria;
- Analysis of the mills identified in the CM, based on materials prepared by prof. Francesco Mainieri;
- Cataloging project of the facilities and the protection and rehabilitation.

The water mills, as Marc Bloch "*marked in the accompanying technical progress of humanity the scope of which far exceeds the story, ultimately modest, art milling*". The existence of mills milling is attested since although millennia man found in their muscles or in domestic animals the major source of energy needed to transform the grain into flour and othercereals.

The oldest reference to the water wheel is located in a epigrams of Antipatro of Thessalonica, dating from around 85 BC, Strabone later recalled "the wonder" of the mill built by Mitridate in his palace Cabeira, around 65 BC. In Roman times Lucrezio and Vitruvio about water mills and remains an extraordinary witness to the complex of Barbegal, in southern France. Neither the Greeks nor the Romans used it much hydraulic mills and this not because of technical failure, because in the continuous and often uninterrupted expansion of the Roman Empire, the goods less valuable was the labor of slaves and "*... this economy of force human was to the ancient world felt less need*" (M. Bloch). The Roman empire fell, the decrease of slavery and population decline led to discover the mechanisms to liberate man from the hard work and the Middle Ages

thus becomes the true stage of the appearance of the water wheel. As regards the various types of mill, the simplest was a horizontal wheel or "ritrecine", an economic mechanism in the construction and, especially in maintenance, but that was a pretty poor performance. It could not in fact to provide a large amount of energy but, being able to work with small volumes of water flow was rapid suitable for mountain areas and for those devoid of rivers and streams to a certain extent. The horizontal mills were very popular until the late Middle Ages and many examples are still found in Greece, in the Orkney and Shetland Islands, Romania, Scandinavia: hence the term 'mill greek or Scandinavian "adopted by some reserches. The mill described by Vitruvius and probably also the one cited by Lucrezio, were wheel vertical type driven to below, which had the advantage of operating in any river with a fairly constant flow and relatively rapid , working with maximum efficiency. The great news compared to the mill to "ritrecine", was the presence of gear that would allow to turn on a vertical axis through a gear wheel, the movement provided by a horizontal shaft. The oldest known remains of a mill "for below" came to light around Pompei, and other evidence were found in the excavation of English Haltwhistle Burn and a Byzantine mosaic. Increased efficiency of the mill for vertical below, is obtained by dropping the water on the wheel from above. These wheels, however, were more expensive, both because more complicated to construct, both because they required a well-directed and regulated power supply. The vertical mill to above has very distant origins and was already used in the early centuries of the Christian Age. In the early Middle Ages, there are evidences of the existence of another type of mill, the "floating" formed by a wheel placed firmly between two boats. But mills were very vulnerable to be damaged at each full and therefore no future. Almost all the mills of the Roman Age were powered by water: the main reason was probably economic, because it was easier to use existing public drainage systems that build a system of independent power. During the Middle Ages, however, was that a significant engineering effort to use energy also streams and rivers of medium-large, through the construction of ancillary structures such as dams, reservoirs reserve channels of power and ancillary structures as dams, derivation of channels, channels refusal to allow the relocation of the plant milling also considerable distances from the watercourse that fed them.

One of the most rapidly expanding number of hydraulic systems in Europe occurred between XII and XIII century end., in correspondence with a period of economic prosperity and above all, strong population growth. As in the early centuries, even in this period the mills belonged to the majority of church bodies, but much more often accompanied by municipal bodies stemming from large families and secular aristocrats. The architectural structure of the mill, varied greatly, depending on the size of the facility and the number of grinders that housed. The building was to

be always divided in two levels: a ground floor, to be processed, which were the millstones, and a lower floor, one room basement that is occupied entirely out of the wheels and mechanisms, which is futile a characteristic feature of the structures in which he had adopted the mechanism of horizontal grinding wheel. Until the ninth century the driving force of water was used in addition to grinding grain in the preparation of malt for beer, in the crushing of the olives, sugar and pigment dyeing, in tanning and to reduce dust in the bark of oak which was extracted tannin. For all these cases we are dealing with uses which required a continuous rotary motion, very similar to that needed for the milling of cereals, it was therefore a diversification of the same process and not a real technical innovation. The speech is rather quite different for those applications 'industrial' hydraulic power, which required a great innovation, or the transformation of the circular motion in alternating motion (fulling-mills, paper mills, metallurgical plants etc..), Which required the exclusive use of vertical water wheels. To create the alternate motion was adopted essentially a very simple mechanism and very old, already known in ancient classic, the camshaft. The first application of such a system was probably in fulling wool (and perhaps also in the beating of hemp), and the oldest news of a job in this field will come from the Italian peninsula in the second half of '900. In the following centuries this machine is widely used throughout Europe, giving the green light to a number of new uses, from the paper from rags to metallurgy. The power, harnessed to achieve the energy required to transform raw materials or finished products, will result in a substantial increase in installed capacity by some existing manufacturing poles, it will give rise to completely new, and its absence or scarcity Instead, it will be one of the major factors of crisis for entire production systems. Since the second half of '800, and especially in urban areas, was already widespread system of grinding mills based on a cylinder, which allowed the production of flour more refined, in rural and mountain areas to the grinding "palmenti" was still and active life, both by millers to ensure a reasonable level of profitability. The reason for this survival is in the simplicity of the technique, which allowed the miller to do all the work, including maintenance tiring, satisfying a limited local market. For this reason "low grinding" has endured for centuries until a few years ago, in many valleys Italy.

1. THE HYDRAULIC MILLS IN CALABRIA

If the rest of Italy, from the end of the twelfth century the urban municipalities turned their interest to the issue of water several times trying to impose its control in the Calabria free municipalities were few, and almost no one could tackle the costs of building a mill and the continuing cost of maintenance. In feudal age indeed, the water rights and their use for irrigation and industrial purposes were carried out by the feudal lord or noble families who had acquired the license. The construction and use of mills, the oil-mills, the fulling-mills and all hydraulic

machines were subject to water deprivation, which were a monopoly of the lucrative business, making the community pay a fee to Baron milling and multure to the miller. Napoleonic law of 1806 repealing the feudal rights in the South of Italy: it was not abolished property rights but the rights and special prohibitive, so, despite the obstacles opposed by the barons, it gave start to the construction of new mills. The nineteenth century was the region in the period of maximum expansion of these production facilities, so that in 1873 the mills with counters of turns in Calabria were in 2501. The increased availability of mills, however, not allowed the elimination of taxes on milling which remained high and burdensome for the community.

The technical characteristics of the mills and other hydraulic machines, and the architectural structure of the buildings were similar in all Calabria. They are not suffered any changes over time, but also their state of backwardness, it was also a reflection of the general condition of the region, even at the beginning of the 800, compounded by the existence of an inadequate road network and scarcity of fairs and markets that did not promote trade. The horizontal wheel, despite the low productivity, was the technology most appropriate to regional characteristics. The works capture structures were very simple and made of perishable materials.

In some plants of Calabria channel ended in a tank, made of earth or brickwork. The towers, called arrows, represent the architectural elements more visible and recognizable installations wheel horizontally. The hydraulic mills Calabrians have a wide variety of types of towers, which also symbolically characterize hydraulic archeology of the region. The buildings were marked by ease, devoid of any ornamentation. Functional installation of sandblasting and their management, the development layout is composed of adjacent rooms, one of which were located the mechanical, another served as a warehouse of tools and grain. Generally to a ground floor and constructed of stone masonry, roof was covered with one or more aquifers, with warping wooden mantle and cover the brick tiles produced locally.

The ordinary and extraordinary maintenance of machinery, hydraulic and walls of the mill, was generally accomplished by miller much to make a "technical" professional job that was often passed down from father to son. The miller did not have a good reputation, because of the delicacy of his role in a society perpetually hungry, and the considerable possibility of fraud, according to public opinion, could have put in place. Farmers, however, from the dangers of fraud defended themselves by following directly the operations of grinding, the mill so teeming life, becoming one of our most important meeting in the small society of the time, place of

exchange dominated by the figure of the miller, one of the most dynamic figures in the static pre-industrial reality.

Although many mills have remained effective until the '50s and beyond, the twentieth century marks a slow crisis, within a few decades, leading to the closure of almost all the mills and oil-mills in the region. The reasons for this decline are numerous and should be analyzed for each specific area, we can say that the imposition of new fees for the use of water, the emergence of a national market with new rules, the backwardness of technical and industrial plants, leaving small grain crops for local consumption and, not least, the advent of electricity were crucial for the reversal of a trend until then growing. The gradual abandonment of the water wheel, it had the benefit of the electric motor. The electrical energy release, in fact, the production units from the territory and the proximity of the source of energy, water, so after a few decades after World War II, the water wheel, and finally disappeared, together, we closed the old business cycle based on exploitation of hydropower.

2. THE HYDRAULIC MILLS IN THE MOUNTAIN COMMUNITY ITALO-ARBËRËSHE OF THE POLLINO

In the northern region of Calabria, which corresponds to the territory of the Mountain Community Italo-Arbërëshe of the Pollino, in the past there were many mills of which few traces remain today, representing the peculiar features of the material culture of the past in this region. The water was certainly one of the greatest treasures of these valleys, and probably one of the factors that most effect on the physiognomy of the specialization of production. This resulted in a distinctive feature of the mills and other mills in this area, unlike that of most of sandblasting of Calabria, where they had seasonal operation, ensured the operation without interruption during the year.

This study was carried out in more depth within the basin Coscile, drawing a map is incomplete and mills in the area of integrating the survey and direct field historiographic production, technical literature, the historical maps and documentary sources, published and unpublished, namely:

- topographic maps of various kinds, including those in the first place dell'IGM both ancient and recent;
- archival sources, including the land of land of different ages;
- local history monographs;
- photographs and other images;
- oral testimonies of those who, now older, is still able to recall their existence.

A considerable interest is then the Hydrographic Map of Italy (late nineteenth century.) 1:100.00 scale, which is the first census-based mapping of mills going to water, and gives a precise idea about the spatial distribution of these structures, before the spread of steam engines and electrical results in the rapid change in the economic architecture gained during pre-industrial or industrial-paleo. In it are reported for the area falling in the Mountain Community, a total of 60 mills, 16 in the basin of the Lao, 26 in the Raganello and 127 in the basin of Coscile. It has, however, some inaccuracies regarding the location, and inaccuracies that could be remedied in the future by deepening the research and by finding and using other sources and a more systematic survey in the field.

Documentation includes: photographs and recent vintage, and other materials, and floor plans of plumbing routes identified by the Land Registry geometric particle, whose plant for the location, dates from the Twenties and Thirties. These plants are almost all in scale 1:2500. Unable to perform an adequate relief of individual buildings (or at least some of them), it seemed appropriate to use sheets of the cadastral map of the land, while to regain their buildings so essential, nonetheless offer a range of data significant on the plants (shape, position and size of construction, length and pattern of channels and exhaust products, water plants which are animated, access roads, various elements of the environment, etc.).

Furthermore, individual plants and the collection of information, were georeferenced and made available under a WebGis, which besides containing spatial data reveals, albeit in a restricted, the permanence of residual elements of heritage natural and cultural heritage that could be found during maintenance and protection.

In speaking of individual mills, it was according to the categories in which they are: mills for cereals (chap. 2.1), fulling-mills (chap. 2.2), oil-mills (chap. 2.3), hydroelectric power (chap. 2.4), spinning. Then, as already mentioned, the research conducted thus can be extended to other tributaries and river basins of the Lao and Raganello, and also to plumbing otherwise.

PHOTO, MAP AND TRACKS OF PADULA AND PELLICCIA (attached)

3. CURRENT STATE

In reading the material remains found on the ground, it was found that all these ancient plants, where you can find, in addition to no longer be in operation by the second post-war average, are in complete state of neglect, many structures have collapsed and invaded by vegetation. In some cases, have been the subject of modern interventions that have changed the original characters. For documentation of the sites on the ground was prepared a hydraulic mills form suitable to

record the various present evidence whose items have been defined based on information derived from technical literature and terminology used in the latter.

The form used is divided into four parts: the first is that you can define the identity card of the site and includes information on the site, the ground conditions, the characteristics of the material remains within the historical data available on 'factory. The second part of the form contains a description of the documentary sources relating to the mills in question, accompanied by archival information and notes about the types of documents consulted. The third part of the card relates to the hydraulic characteristics and technology structure in question, if the material remains are sufficiently preserved to allow a reliable reading of this particular issue. The data were selected during the reconnaissance on the ground and cover both modes of derivation and fitting of water that the details of the building itself and the types of schemes, it housed.

SHEET OF CATALOGING AND PHOTO DOCUMENTATION OF HYDRAULIC MILLS (attached)

3.1 ASSUMPTION OF REHABILITATION

The area that we occupied is rich in many-layered historical and cultural traces and signs and historical centers, rural architecture, archeology hydraulic rows and hedges, walls, fragments, more or less extended and supplements, of the agrarian landscape. At present, the critical aspect of these key witnesses, while maintaining a degree of integrity, is the fragmentation: the case of "islands", pieces of a mosaic. This criticism can be read in its various components: the degradation of the water system (such as the absence or removal of water of a large part of the courses of rivers and streams, below the minimum), the abstraction, derivations and control of water-course sometimes true stress factors of the water body of fish and riparian vegetation, degradation of river sections and the presence of mining activities, the collapse of the traditional fabric of the agricultural settlements and the abandonment and the deskilling of many cultural goods; the excessive and disorderly use of environmental goods, the impact on the landscape of certain infrastructures. In light of these considerations has been to propose such a project aimed at comprehensive and coordinated management of available resources, through recovery and enhancement of the landscape, wildlife, vegetation, forms related to the structuring of the territory.

It moves the will to implement forms of protection and conservation, through the construction and rehabilitation of a complex ecological network, reactivating the physical connections, where these are missing or extremely weak and vulnerable.

The specific objectives can be summarized in four main points:

- enhancement of natural landscapes and semi-natural environment of a farming generally trivialized through mending space remaining areas of high biotic potential.
- creation of a "*network of hydraulic theme archeology in the rural landscape*", which developed throughout the area of high and medium Coscile Valley as "paths museum" around the area, go to illustrate, in the form dynamic, the story the geographical scope (see annex). This network of trails would use, even for educational purposes, of a vast landscape of canals, mills, hydraulic machines, tracks, often are overridden by torrents suggestive historical bridges, and which are related to water and buildings that it should their operation. Abandoned buildings, demolished, which shows elements which allow us to rebuild their functional past.
- intervention and recovery structures making up the "*system of hydraulic machinery Frascineto*", which provides rehabilitation and conservative structural consolidation.
- recovery of the structures composing the *System of hydraulic machinery Frascineto* provides for the strengthening of relations that have historically artefacts introduced by the surrounding territory and wants to lead a process of understanding and appreciation of "material culture" of places.
- extensive use of public land, which is obtained through the achievement of the objectives previously expressed and coordination of the actions that flow from them.

The main actions are summarized as follows:

- a) carrying out of natural elements such as hedges, vines, trees, etc., well placed in both ecological-environmental and historical landscape and expansion of forest formations, with a link landscape and ecological;
- b) arrangement and cleaning of the paths on the banks;
- c) restoration of riparian vegetation, woody-shrub;
- d) the development of areas designed for social, educational and recreational activities;
- e) adopt agricultural practices compatible with the requirements of environmental protection;
- f) the development of pedestrian and cycle paths and on road signs for connecting points of historical and architectural, landscape and ecological;
- g) location of *bulletin boards* educational topics along the routes to highlight the main natural, historical and architectural;
- h) the development of sites for visits within the regulated areas and distribution of information services to visitors;
- i) put into the safety of artefacts included in the theme;
- j) implementation of an Environmental Education Center;

k) consolidation and restoration of the structures identified in the *System of hydraulic machinery Frascineto*;

The management of the *Network theme archeology water in the rural landscape and the system of hydraulic machinery Frascineto* may be entrusted to a culture already present in the territory, which constituted an ad hoc basis by which the CM Italo-Arbereshe of the Pollino could provide a measure of agreement, including the possible use of structures to organize activities and events, with the disclosure and use of local memories.

PROJECT (attached)