

Architecture and Proto Industry.

Watermills in the historic peri-urban landscape of Benevento (Italy)

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Topic 1: T1.1. Study and cataloging of vernacular architecture

Abstract

The landscape of Benevento is historically characterised by the presence of vernacular architectures which exploited the driving power of water for productive purposes. The abundance of watercourses and natural resources coupled with the large quantity of agricultural products enabled the development of a real proto-industrial centre, which was particularly active in southern Italy between the 18th and 19th centuries. Production activities linked to the manufacture of textiles and leather were flanked by a dense system of watermills. Situated in the proximity of the city walls and the town's main rivers, such watermills and their inherent complex network of canals have shaped the historic peri-urban landscape of Benevento over centuries. Thanks to the availability of numerous historical maps and archival drawings of mills, a link can be established between the past and what is currently visible in the area. The recognition of the physical traces of the mills and of the remains of the water adduction system deepens the knowledge of an unresolved strip of city territory that still retains a peri-urban character, being delimited on one side by the historic walls and on the other by the 20th century expansion of the city. In light of these considerations, this paper offers a new contribution to the study of the proto-industrial architectural heritage of Benevento, focusing on the interpretation of material traces of the past with the purpose that their recognition could strengthen the identity of this part of the city.

Keywords: historical maps; canals; construction techniques; proto-industrial production techniques.

1. Introduction

In the centuries preceding Italian unification, the city of Benevento was a small enclave of the Papal State, surrounded on all sides by the territories of the Kingdom of Naples, then of the Two Sicilies. Its peculiar position, detached from the pontifical territories and close to the Neapolitan ones, has put the city in a severe competition with the neighbouring areas, especially for the exploitation of natural resources (Del Prete, 2009a; Zazo, 1950).

Despite some attempts over the centuries by the kings of Naples to divert the water flow from the Serino spring, under their jurisdiction, to the capital of the Kingdom (Del Prete, 2009a), Benevento has always managed to use its

waterways profitably and feed its few but flourishing proto-industries.

These industries, founded in the Middle Ages (Ivone, 1997), were located on the south-western side of the city and exploited the driving force of the water of the Sabato river – which together with the Calore river flows through the city – mainly for the production of flour but also of leather and textiles (Del Prete, 2009b).

These vernacular architectures, repaired and sometimes rebuilt countless times over the centuries due to the frequent flooding of the river, functioned thanks to the water provided by a complex system of artificial canals. They had the double task of providing motive power for the mills and water for the fertile gardens and orchards located nearby.

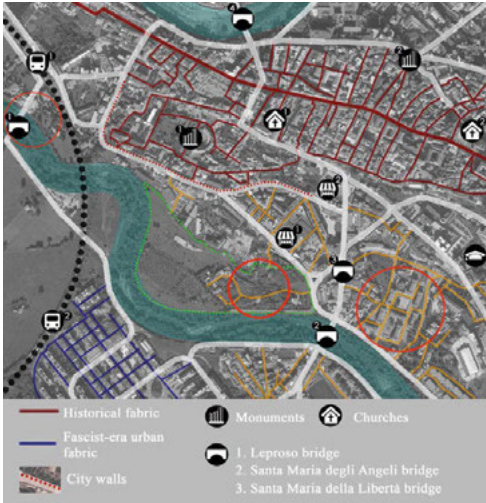


Fig. 1. Benevento, zenithal view of the city and the mills area, highlighted in red (Source: elab. by Cuntò, Intermoia, Longo, 2016).

At present, the canals are buried and their traces are only visible in a few limited sections, while not many material traces of the mills remain, abandoned to total decay. They are located in a peri-urban area characterised by a strong presence of greenery, and surrounded by residential areas and the Sabato river (Fig. 1).

The contribution focuses on these architectures, framing them in the historical and contemporary landscape. The methodology involves crossing rich data from cartography and archival documentation with the reading and interpretation of the material traces still visible on the territory.

2. Water-built heritage in the historic landscape of Benevento *Pontificia*

In the history of the city of Benevento, the water of the Sabato and Calore rivers has always been a vital and fundamental source of energy but also a cause of destruction and disputes. While the artificial canals made it possible to activate the mills and irrigate the gardens and trees, the frequent floods caused regular damage to the architecture and modification of the landscape. The current course of the Sabato river, in fact, in the area under investigation between the Roman

Leproso bridge and the *Borgonero* district, does not correspond perfectly to the course shown in the historical maps of the 18th and 19th centuries.

Floods occurred on a regular basis. In the 18th century, the city was hit by at least three major events in 1707, 1753 and 1778. These conditions required constant maintenance and sparked actions such as planting trees (e.g. poplars) along the river banks, considered necessary for consolidation and improvement of flood resilience.

There were frequent requests from landowners to officially remeasure their arable land, often reduced in size or enlarged as a result of the flooding, as well as a consequence of the reconstruction work. Therefore, the changing nature of the area required a constant attention to its landscape and architectures.

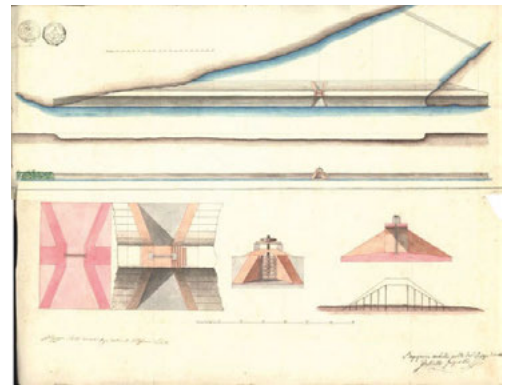


Fig. 2. Gian Battista Iazeolla, river Sabato dam project (ASBN, *Notai, Atti dei Notaio Bartolomeo Maziotta*, n. 16487, 1855)¹.

In addition, the area was marked by several legal disputes between the owners of the proto-industrial buildings, due to the unauthorised opening of new small irrigation canals from the main canal (*formale*), diverting the waters of the Sabato river from a sluice (*palata*) situated in a place about a mile east of the city, in the present-day *Borgonero* district (Ivone, 1997).

¹ Images from State Archives (Rome and Benevento) are published by permission of the Ministry of Culture (MIC). Further reproductions of the drawings are not permitted.

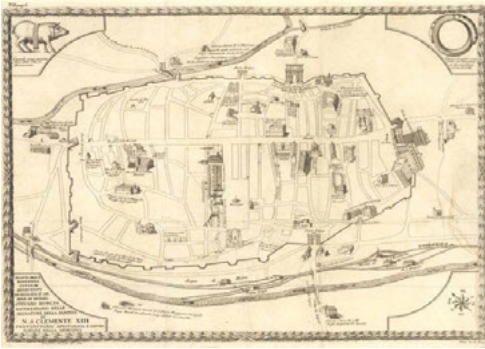


Fig. 3. S. Borgia, view of the city of Benevento. The lower part shows the Sabato river, the artificial canals and the mills, which are outside the city walls (Source: Borgia, 1764).

This sluice, which allowed to divert part of the Sabato river and to activate mills and irrigate gardens, already existed since the end of the Middle Ages (Ivone, 1997), and was rebuilt, even on other sites, several times over the centuries. In the middle of the 18th century, a new version of the sluice was built and financed by all mill owners, whose interest was guided by the benefits of such hydraulic work² (Ivone, 1997). In 1821, another major maintenance operation was carried out³, while in 1853, a similar operation was necessary in response to another flooding event. In this case, the engineer Gian Battista Iazeolla, a well-known figure in the technical environment of Benevento at the time, intervened (Iazeolla, 1996) (Fig. 2). The latter presented a detailed plan of the dam – in the document he wrote “Map of the new dam built on the Sabato river” – without, however, specifying the location of the new structure⁴.

The owners of the businesses, which were not only connected to the milling of grain, belonged to the local upper middle class or the clergy. The maintenance of the architectures and the complex hydraulic system connected to them (canals and sluice gates) required consistent, long-term

investments, which small entrepreneurs and farmers could not afford.

In addition to the mills for flour production, which harnessed water as power source, the city had mills for paper production, fabric factories (*gualchiere*) for textiles and felt and dye factories (*tintiere*) for textile dyeing. There was no lack of tanneries and proto-industries producing pasta (*maccheroni*) (Fig. 3). These activities were supported and encouraged both by Pope Orsini in the period following the earthquakes of 1688 and 1702 and by Governor Louis de Beer during the French Decade. In both cases the importance of these industries for the city economy and the employment of its inhabitants was recognized (Del Prete, 2008).

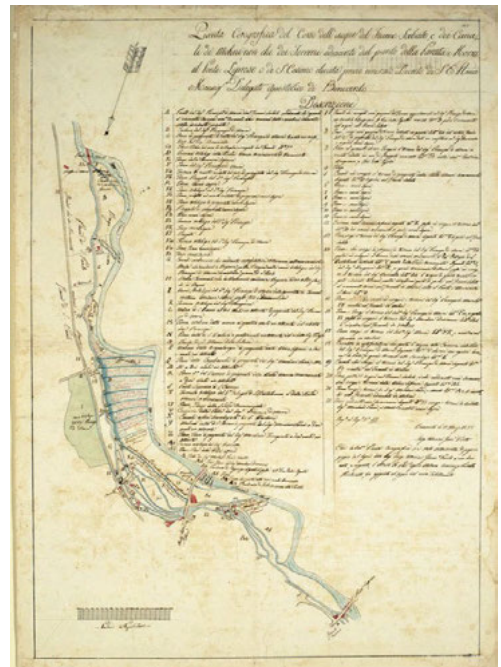


Fig. 4. L. Cottarini, map of the Sabato river, canals and mills, from the Morra sluice gate to the Leproso bridge, 1828 (Quesada 2008; ASRM, *Disegni e Piante*, coll. I cart. 7 foglio 27).

After the disastrous earthquakes of the 17th and 18th centuries, Pope Orsini (Pope from 1724 to 1730), already archbishop of Benevento since 1686, initiated numerous actions to support the reconstruction of the devastated city and boost the wool industry. This period saw the opening of a

2 Rome, State Archive (ASRM), *Camerali III*, b. 365/115, f. 30.

3 ASRM, *Tribunale della Segnatura, Jura diversa*, b. 217, f. 84, July 1820.

4 Benevento, State Archive (ASBN), *Notai, Atti del Notaio Bartolomeo Maziotta*, n. 16487, a. 1855.

large number of *calcare* (sites for lime production) and facilities for brick production. Together with limestone, bricks represented a common choice as construction materials for local buildings (Menzione, 2003; Taddeo, 2008).

Louis de Beer, governor of the town on behalf of Talleyrand, took the fate of the small town and its economy very seriously (Ingold, 1984; Ceniccola, 2014). During his government in the early 19th century, he promoted measures to consolidate the banks of the Sabato river and supported the hat and pasta industry. In order to increase and improve pasta production in Benevento, he invited workers from the town of Torre Annunziata, near Naples, in order to teach the local workers how to properly dry goods before selling them (Del Prete, 2009a).

3. Watermills: canals and architectures

At the beginning of the 19th century, local aristocracy and the Church owned eight mills close to the Sabato river. They were located outside the city walls beyond *Porta Rufina* in three areas: near the Roman *Leproso* bridge, in the *Acqualonga* district and on the land east of the *Santa Maria della Libera* bridge (Fig. 4).

The Morra family, an important noble branch with properties in Benevento and the Kingdom of Naples, owned three mills (*Santa Barbara* mill, *Nuovo* mill and *Sant'Eramo* mill) as well as a tannery⁵. The Marquises Pacca and Terragnoli were the owners of two mills located next to the *Leproso* bridge, and of the *Capibianchi* mill in *Acqualonga* district. The *Badia Sofiana* (Church of Santa Sofia, now a Unesco heritage site) owned the *Acqualonga* mill – one of the few structures still visible – while the *Mensa Arcivescovile* (archbishop) owned another structure on the same site (Fig. 5).

Thanks to a rich iconographic documentation, mainly consisting of maps of the area and few rare detailed architectural drawings, dating from

the late 18th and early 19th centuries, it is possible to catalogue mills and other production activities and to know their location. These drawings also allow to reconstruct the course of the complex system of artificial canals that branched off from the main *formale* and fed the horizontal wheels of the mills.

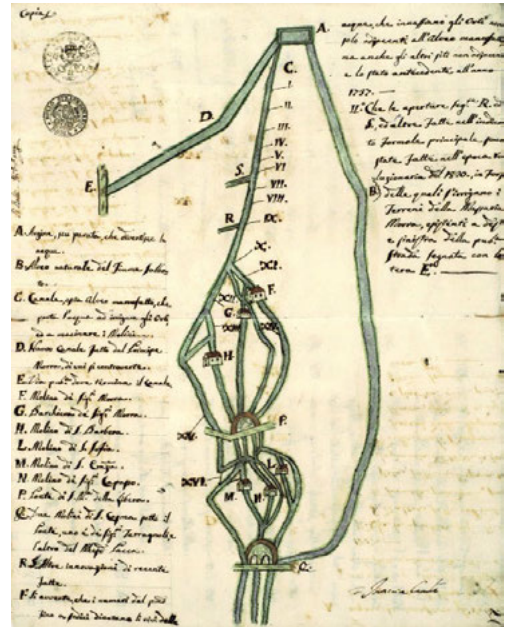


Fig. 5. P. de Juliis, plan of the canals with the innovations made by Prince Morra, July 1820 (Source: Quesada, 2008; ASRM, *Tribunale della Segnatura*, b. 4352, f. 84).

The maps were drawn up in order to re-measure the arable land after the frequent floods as well as during disputes between the owners of activities mainly related to the use of water and the opening of new unauthorised secondary canals. Significant in this respect are the drawings preserved in the notaries' files of the Benevento State Archive and in the documents of the State Archive in Rome (Cirillo & Musi 2008). These representations allow to locate not only the architectures, but also the canals, now buried, the vegetable gardens and the bridges, some of which are no longer used as such. This is the case of the three-arched *Santa Maria della Libera* bridge, which divided the possessions of Prince Morra from those of the *Badia Sofiana* and the *Mensa Arcivescovile*. Of this bridge, only

5 ASBN, *Notai, Atti del Notaio Benedetto Perrillo*, n. 10568/1, 1808.

a partially buried side remains visible today, integrated into the city's road system.

Canals and mills are also clearly visible in illustrations of the city (e.g. Borgia (Borgia 1764) and in the plans of the Gregorian land register from the 1820s⁶ (Fig. 6).



Fig. 6. Benevento, Gregorian land register, 1825. The map shows the three mills located in the *Acqualonga* district and the system of canals (Source: ASBN, *Catasto gregoriano, Benevento, Mappe, sez XI, foglio V*).

Information on the technological system implemented in the mills is scarce. Certainly, the mills of Benevento were not historically equipped with a vertical wheel but, like most of the architectures of this type located in Campania – e.g. the mills of the Gragnano Valley (Russo et al., 2018) – they had a horizontal wheel, placed at an underground level and which, once powered by the water flow, innescated the rotation of the millstones (Florio, 1871). The wheel system was therefore not visible externally and the structure, according to the plans available, had not piezometric towers (i.e. water storage devices).

The disputes between the owners together with the deeds of the notaries are also a source of information to deepen the understanding of the mills and their construction techniques. In the case of the mills in the vicinity of the old *Leproso* bridge – of which one remains today,

converted into a theatre – the list of enlargement works dating from the mid-19th century is accompanied by a detailed plan and legend⁷.

The mill, owned by Marquis Pacca, had, in addition to the spaces used for milling grain, rooms for sifting the grain (*cernotoj*), and square areas, located outside the building, used for drying cereals and threshing them (*aje*). The large two-storey structure had walls made of local limestone, known as *campese*, and bricks every two palms (approximately 52 cm). The vaults were made up of *zoccoletti*, that are bricks laid flat. The use of the term *zoccoletti* undoubtedly reflects the influence of the technical culture of Rome and the Papal State, where this word was commonly used to indicate the tiles with which these types of vaults were built (Cavaliere San Bertolo 1826-1827). In the Neapolitan area, instead, they were known as *pianelle*. The roofs, on the other hand, were built with chestnut wood, available locally, and with two pitches, as solution known as *alla Calabrese*.

3.1. The *Acqualonga* mill

The *Acqualonga* mill is a significant case in Benevento, being one of the few mills that did not experience total demolition or reconversion to other activities.

Probably founded in the Middle Ages (around 900 AD), it was owned by the Church, in particular by the *Badia Sofiana* (Borgia 1764). The structure visible today is the result of numerous reconstructions and transformations (Fig. 7). The 1707 flood, for example, destroyed three mills from the foundations, including the *Acqualonga* mill, which was partially or totally rebuilt in a different way (Zazo 1950).

6 ASBN, *Catasto gregoriano, Benevento, Mappe, sez. XI, foglio IV, 1825; sez. XI, foglio V, 1825; sez. XII, foglio I, 1825.*

7 ASBN, *Notai, Atti del Notaio Carmine Nardomeo*, n. 15606, 1851.



Fig. 7. Benevento, *Acqualonga* mill. View of the western façade.

The current planimetry and the system of buried but still partially visible canals (Fig. 8) do not correspond to the available topographical plans dated between the first and third decade of the 19th century.



Fig. 8. Benevento, *Acqualonga* mill. View of the buried canal and of the 20th century sluice gate.

In the topographic plan drawn up between 1826 and 1827 by the architect Giovanni Torre in connection with a court case between Goffredo Morra and the archbishop of Benevento⁸, the *Acqualonga* mill shows an L-shaped outline and appears to be fed by a large canal running through the central body where the millstones were located.

Similar information can be deduced from the plan of the mill drawn up in 1814 in connection with a rental contract for the structure owned by the

8 ASRM, *Tribunale della Rota, Jura diversae et cedulae privatae*, b. Z-634, 1827.

Camera Ducale during the French domination of the city⁹. The plan of the mill had to be redrawn, as the available one did not correspond to the state of the building and the land, probably due to the repairs carried out after the floods at the beginning of the century (Fig. 9).

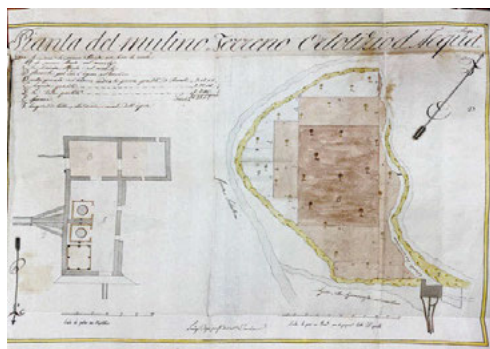


Fig. 9. L. Porzi, plan of the *Acqualonga* mill, vegetable gardens and surrounding lands, 1814 (Source: ASBN, *Notai, Atti del Notaio Filippo Zoppoli*, n. 14972, 1814).

The mill had two millstones of different sizes (9 and 6 ½ ounces, about 18 cm and 13 cm) and three rooms, two of which were used for sifting the grain and one, larger, for grinding. The entrance was located on the eastern side of the mill in front of a small bridge crossing the canal.

Today the mill is substantially different from these drawings and descriptions. The shape has changed from an L to a T and the original entrance can no longer be identified (Fig. 10). In addition to the two millstones listed in the 19th century document, a survey conducted in 1980s identified three addition millstones (i.e. five in total) connected to horizontal wheels and a further millstone situated on a raised wooden floor, now collapsed, with a vertical wheel, probably from the 20th century¹⁰. The vertical wheel is still visible today while the millstones are not easily detectable.

9 ASBN, *Notai, Atti del Notaio Filippo Zoppoli*, n. 14972, 1814.

10 Benevento, Archive of the City Planning Office, Benevento Municipality, *Survey of the Acqualonga mill*, unknown author, 1980s.

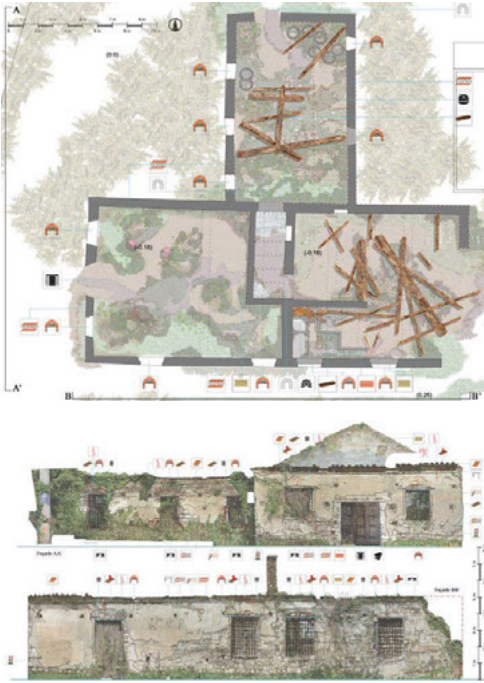


Fig. 10. Benevento, *Acqualonga* mill. Plan, western and southern façades (Source: drawing by Cuntò, Intermoia, Longo, Restoration Studio, Dept. of Architecture, University of Naples Federico II, prof. V. Russo, July 2016).

From a present perspective, the construction techniques used are similar both in the north-south section (18th century), and in the east-west side (Fig. 11). The masonry appears to be a mix, as in the case of the mills at *Leproso* bridge, of rough-hewn ashlar of local limestone and bricks. The roofs, inclined with two pitches, are made of wooden beams and brick tiles. The mill, used until the second half of the 20th century, has some internal partitions in squared tuff ashlar and a concrete flooring. Some wooden architraves have been replaced by steel profiles.

The comparison between the historical plans and the present situation allows to identify a canal and a sluice gate, which are now partially visible and not indicated in the 19th century drawings. They are located along the southern front of the building. The canal probably animated the vertical wheel, located in the more recently built east-west body (Fig. 12).

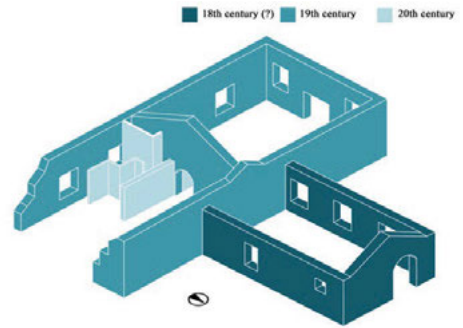


Fig. 11. Benevento, *Acqualonga* mill. Hypothesis of transformation (drawing by S. Cuntò, L. Intermoia, L. Longo, Restoration Studio, Dept. of Architecture, University of Naples Federico II, prof. V. Russo, July 2016).



Fig. 12. Benevento, *Acqualonga* mill. View of the vertical wheel (Source: Cuntò, Intermoia, Longo, 2016).

4. Conclusions: the mills in the current peri-urban context of the city

At present, the *Acqualonga* mill is in an advanced state of disrepair and is completely abandoned. However, its strategic location, between the ancient walls, the Sabato river and the fascist expansion of the city, makes it a potential place of attraction, both architecturally and in terms of landscape. Located in a large and isolated green area designated by the local urban plan (PUC) as zone F (activities of general interest), it was acquired by the Benevento municipality in 2000 and is part of a project known as the “Green Park and Sabato river Boulevard”. Although the project on the building has not yet started, funds for its restoration have been allocated and should be spent in the near future.

This, together with the other planned interventions in the area, would make it possible to enhance a forgotten part of the city which underwent profound changes in the 20th century (Vergineo 1989; Bencardino 1991). In addition, the recognition of the historical value of the building and its context, would allow the city to regain possession of a part of its history unknown to most citizens. Unlike the area of the mills owned by the Morra family, which today appears densely built – and where only the *Molino Nuovo* is still visible (former Rummo pasta factory, now a hotel) (Del Prete 2011) – the part of the city where the *Acqualonga* mill is located still retains a rural and peri-urban character as in its past centuries that deserves to be protected.

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