

THE SOCIAL AND SPATIAL DYNAMICS OF AN URBAN ECOLOGY,
WATER AND SANITATION MANAGEMENT IN EARLY MODERN
PIACENZA

by

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DEDICATION PAGE

I dedicate this to all my students,
the generation that will have to confront climate change in their daily lives,
for the rest of their lives.

I realize that many human actions of the past
discourage, and
frustrate them.

I hope that with research and knowledge they will also find examples of problem-solving
that allowed for social unity and care for the environment.

The actions of the past are mixed and varied and rarely accomplished all that they should.
However, there are also always examples of right responses that enabled human survival
and cared for the planet.

As future generations move forward and deal with the legacy my generation has left to
them,

may they be able problem-solvers,
daring
risk-takers,

who challenge old assumptions
while caring for others, communities and the earth.

And may they find some guidance from how we have handled our problems in the past.

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ABSTRACT

This research is about the social/spatial management of water in an urban setting. The water utility of Piacenza, Italy, and specifically, the organization of the now extinct canal system, was investigated for the period between 1545 and 1736. Through analysis of the administration of the canal system and the water utility this thesis constructs an aspect of the political ecology of Piacenza. Political ecology as a discipline lies at the intersection of the environmental context, land use, spatial design, demographics and social relationships. The study looked at how the city organized itself to manage urban water and sanitation delivery, the methods used to communicate with the users, the actions taken to keep the system in good repair, the responses to crises, and the limitations of the social organization and technological capabilities.

The archival documents contained within the *Congregazione sopra l'ornato* (CSO), the municipal committee charged with management of the canals, form the core of the research. Other archival collections provided supporting documents along with maps and diagrams. Analysis was done through reorganization of the documents into chronological tables. Information on the writers, recipients and users of the documents was tracked as well as land-uses, professions mentioned, and canals designated within the documents. This allowed for questions to be posed to the material to provide a picture of the social organization of the canal system.

Analysis revealed a finely-tuned social system that involved noble oversight, the use of expert engineers, public/private partnerships for maintenance of the canals with millers and *consorti* as key people, and an attempt to control cheating with fines and penalties. The people in Piacenza did not always manage their water well, but they continually had to react to the real dynamics of the ecosystem in which they were located, whether the water ran high or low, how much was available and then who got it. Their choices and the social management of the resource may well provide us with important lessons for our own tomorrows in a world with a changing climate and hydrological regimes.

LIST OF ABBREVIATIONS USED

ASPc	Archivio di Stato di Piacenza
ASPr	Archivio di Stato di Parma
BPL	Biblioteca Passerini-Landi
CSO	<i>Congregazione sopra l'ornato</i>
AT	<i>Acque della Trebbia e di altri torrenti e rivi</i>
CM	<i>Collegio dei Mercanti di Piacenza (1524-1840)</i>
ASPc-M	<i>Mappe, stampe e disegni, Piacenza</i>
ASPr-M	<i>Mappe, stampe e disegni, Parma</i>
BPL-M	<i>Mappe, stampe e disegni, Biblioteca Passerini-Landi</i>
CG-P	<i>Consiglio generale e anzianato, Provvigioni e Riformagioni</i>

GLOSSARY

Acqua/aqua: water

Acqua estiva: the seasons for water management that extended contained 3 separate periods and extended over all from 25 March to 8 September. Overall, it was the time for irrigation of agricultural land.

Acqua jemale (iemale): from the 9 September to 23 April, when the canal water was primarily used for mills.

Acqua piovane: rainwater

Aqua pluviale: rainwater, *pluviale* can also refer to a drainpipe or downspout

Assoni: flat pieces of wood used for paving

Asta: the main course of a river, also a horizontal rod, or a pole

Azaso: named as something to do with material infrastructure, the meaning is unclear.

Aviso: an advisory, an order given generally to a selected group of individuals

Berlina/berline: A divider or bulkhead in the course of the water used to open and close channels. A *saracinesca* was a type of *berlina*, made of wood, a lock that could be lowered to close a channel

Bocca/bocche/bochetto/bochetti: an outlet or hole, a place where water enters from a canal into a field or smaller canal

Bonification: to drain wetlands or marshes often to increase agricultural production

Buchi Madonna: Parallel stones set into the banks of the channel that allowed a limited flow of water into a channel for irrigation. Because of the limited size of the opening it was unnecessary to include a lock to open and close the opening. It was used in urban food gardens with recycled ancient Roman stones. However, the CSO documents show that there was a channel known as *Buchi Madonna* located outside the city walls.

Buzzoni: Bundles of twigs and small branches used to secure the banks of a river or torrent and to prevent further erosion.

Calzina/calcina: slaked lime with sand for plaster or mortar

Capitolo/i: technically the word means chapters, sections or items. Typically it was a document about infrastructure, a part of an agreement between the city and other parties that detailed the type of infrastructure, how it was to be built, the materials and

specifications of the construction, and the maintenance and repair agreement. The term *capitoli* applies as each paragraph was numbered.

Canadello: a little canal

Causa: lawsuit

Centurizione: refers to the intensive infrastructure of irrigation canals and roads that the Romans built in the Padana Valley. This level of comprehensive planning and restructuring of the landscape was seen as a distinctly Roman act.

Cepata/zepata: A form of infrastructure that remains unclear. People were taxed according to their ownership or use of a *cepata* which implies it may have been a drain or inlet.

Cesso/i: a cess pit, pit toilet

Chiaviche/chiavica/chiavi/chiaviga: a covered canal with a sealed bed. Also indicates a drain or sewer that was established at the channel outlet in the shape of a lock that could be opened or closed, to moderate the introduction of the water and to hinder any backwash.

Colatore: a drain, an excavated channel that was dug to drain wetland. The purpose was to enhance the use of marshy land. The Fodesta canal was eventually referred to as a *colatore*.

Colonna: The main waterworks of Piacenza as it was the location of division for the 2 primary water channels that fed the city. There a sheet of lead, marked in degrees, indicated the amount of water allowed to flow into the city.

Comune: a municipal district or city, the word *comune* indicates a municipal government.

Concessione: a license or permit to access and use water, it may have involved the construction of infrastructure and a list of rights and obligations.

Condotto: a general term for a pipe that carried water from one place to another.

Convocati: documents that record the minutes of the meetings for the CSO.

Divisione delle acque: an expression that indicated a division of water from the Trebbia due to a time of water scarcity.

Filatoio: a spinning wheel. This term also designated large industrial facilities with water-driven spinning processes.

Fiume: a river. The Trebbia is considered a fiume.

Gatto: a local piacentini word for a water pipe. In Italian a *gatto* is a cat.

Gattello: a pipe of terra cotta for water.

Ghibelline: a political faction that rose during the Middle Ages aligned with the Emperor and Imperial rule.

Grida: a decree or order that frequently covered all urban residents

Guelfi: The political faction that was the alternative to the Ghibelline, the Guelfi were affiliated with the papacy.

Horto/orto: from the Latin, *hortus*, a kitchen or vegetable garden.

Hortolano/i: the gardener

Immonditie/immondizie: garbage, waste, trash, rubbish, litter, refuse, though in the CSO documents it most likely also indicates sewage.

Incile: An inlet in the bank of a river, canal, or stream that directed the water to an opening so that it could be extracted. There were 2 types of inlets, one allowed water to flow, the other was a part of a sewer or drain.

Istanze/istanze: an order from the CSO.

Ledame/letame: manure

Licenza: license

Macinatore: general term for the canals that served industrial facilities or mills.

Massari: The term is used to indicate people who had authority over individual streets, a street- master who dealt with the needs for street repairs and upgrades. The term is used infrequently in the CSO.

Massone: mason

Mazzi di ferra: this term is unclear but probably indicates some form of infrastructure made from iron.

Memoriale: a letter sent to the CSO from a local resident or group of residents.

Molestare: to harass, molest, bother, annoy, disturb. Often in the *memoriale* the writer will ask the committee to grant their request without *molestare*, that is, without further disturbance.

Molino/i, mulino/i: mill or industrial facility.

Molinario/i: miller(s)

Padana: comes from the Latin word for the Po, *padus*. The Padana valley is the Po River valley.

Partitore: the point of division. Whether by natural or artificial means it is the location of a means that divides the water into two or more streams.

Pegno: a pledge or security, something that might be pawned, or a forfeit.

Pennello: branches and stones placed to resist the erosion the banks of a water channel.

Pozzo: well, *pozzo neri* is a black water well, *pozzo necessario* is for sewage, *pozzo bianco* is a white or sweet water well. *Pozzo morti* would be a filled in or dead well.

Quadrelli: clay bricks and/or squared stones

Querele: a lawsuit

Quindicena: a regime that limited the number of hours water was allowed to be extracted for irrigation. Generally, the term referred to a period of 48 hours from noon Friday to noon Sunday during the summer season.

Riazoletto: possibly a small channel

Ragione di acqua: Water rights granted in concessions from the person or institution with authority over the water. Concessions stipulated varied times and uses for water.

Regimi di distribuzione, Abbondanza: the distribution regime during times of water abundance.

Regimi di distribuzione, Scarsa: regulations that come into effect during times of low water flow and drought. Generally the authorities attempted to cut the flow into the channels. Or they might have chosen to cut off certain uses such as irrigation.

Rudo: a piacentini word that indicates something extremely distasteful such as sewage.

Sabbia: sand

Salegare: paving

Saligatto/saligati/salegato: paved

Sassi: pebbles

Supplica/suppliche: a letter with a request sent to the duke or the CSO

terrazzo fluvial: alluvial deposits from rivers left over time

Terre di aqua: this term is unclear but as it was used in a CSO order when people were in trouble over the issue as it pertained to canal cleaning, it could have simply been mud or the silt from the canal.

Tassa: tax

Torrente: a stream, often a mountain fed channel that goes from violent, fast moving surges to slow and diminished flows between rainfalls.

Volto/voltino: a vaulted structure or covering for a canal, may also refer to the infrastructure involved when canals took turns, in other words, the corner of the channel.

MEASURES

Linear

Braccia piacentine is 0.46956m. 6 *braccia* = 1 *trabucco*

Canala: the ancient hydraulic measure of Piacenza, a measure of the space of a channel into a width of 12 oncie and a height of 9 oncie which together gave a volume of 108 oncie of flow.

Oncie: in terms of measure for infrastructure it is 3.9 cm.

Land

Pertica: is 762 meters squared and is divided into 24 *tavole*.

Piedi is equal to 2.64m.

Tavole is divided into 12 *piedi*.

Measures for food

Liquid

Brenta equals 75 liters

Boccali: 0.78 litres or 2 pinte

Pinta: 1/48th of a *brenta*

Veggiola: equals 10 brente

Solids: Grain

Copello/i: 1.8 kilos of grain. A piacentini *staio* = 15 *copelli*

Mine: $\frac{1}{2}$ of a *staio* or 17.4 litres

Staro/staio: 34.8 litres

Libbra: is equivalent to 317 grams.

Peso: is 25 *libbre* which equals 7.93 kilograms.

Oncia/oncie: is equal to 26 grams

Money

Lira di Piacenza: prior to 1800 = 20 *soldi*.

Scudo: was equal to 7.25 *lire*

Soldo: was worth 12 *denari*.

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CHAPTER 1: INTRODUCTION

This research began with a desire to better understand how humans behave in cities and how that behaviour is linked with spatial design. The records of the *Congregazione sopra l'ornato* (CSO) were suggested to me as one possible avenue of investigation for the doctoral degree. The records involved the organization and management of the city, but what exactly that meant was unknown when the research began. Nevertheless, the archives offered a glimpse into the administration of an Early Modern urban space and thus became the centre of the enquiry.

In an exploratory trip in 2007 to Parma and Piacenza the possibility of water management and the existence of the canals came to light. There was no reason to expect this as a walk through Piacenza quickly makes clear the lack of canals today. But there they were, in the archival documents and on the maps. Those maps, with their traces of now vanished canals, triggered the search for a greater comprehension of how water had been managed and how that had affected the urban space of the city. It was fortuitous that when the CSO archives in Piacenza were finally examined they were shown to contain a significant amount of information on the canals, their management, and some of the effects on the city space.

The work that follows is focused first on an analysis of the archival documents contained within the CSO. Only a portion of the documents, those that included water management, broadly speaking, were used. The work was confined to the time period of the Farnese reign, 1545-1736. There is much more material available in Piacenza on the canal system. Water is a wide and comprehensive category in cities and it is covered by many types of administration and their documents that lay beyond the scope of this research. This work is in no way the complete story of the Piacentine water system, merely a single aspect of it, as illuminated by the CSO archives.

1.1 SUBJECT, PLACE AND STRUCTURE OF THESIS RESEARCH

This thesis asks how people organize themselves to share and manage water in a city and thereby do or do not create resilient systems. The political ecology of a northern Italian city from the 15th to 18th century is the focus of this work. The investigation looks

at how the city organised itself to manage urban water delivery, the methods used to communicate with the users, the actions taken to keep the system in good repair, the responses to crises, and the limitations of the social organization and technological capabilities. This work seeks to weave together a story about urban water management from the documents left by the committee in charge of the utility along with an understanding of the urban space and the local ecology. Water is the most essential resource for life and historically cities have used water for drinking, cooking, sanitation, irrigation, transport, milling and other industrial processes. The supervision of water within an urban space directly affects the health and well-being of the population and whether or not the city can grow and develop economically. This thesis looks at how one urban administration, over 200 years, sought to manage a gravity-fed canal system that provided water to the city.

The city of Piacenza is located within the province of the same name, in the Emilia-Romagna region of Italy. The city sits on the south side of the Po River about 65 km southeast of Milan. While Piacenza was bombed in WWII, the historical centre remains largely intact. The ancient Roman core is easily visible in the structure of the streets, which are surrounded by the Medieval and Early Modern extensions. The final walls, built in the 16th century expansion by the Farnese dukes, survive in part and now host park-like public walkways. Beyond the walls, in what used to be the agricultural fields that provided for the urban population, are suburbs where 60% of the today's inhabitants currently reside in mostly post-war developments. These extend out to the prime farmland to the south and west of the city. Further away from the farmland and the city are the Apennine Mountains, which are visible on clear days.

There are no discernible canals within the historical city centre of Piacenza today. They were completely covered over by the early 20th century as the infrastructure was revised into a modern water and sanitary system. Potable water for the city today comes from deep artesian wells. Yet, for about 2000 years, beginning with the Romans, Piacenza accessed much of its water through canals mostly from the nearby Trebbia River. The Roman system, which fell into disrepair for a time, was revived and expanded in the late Middle Ages. While most of the technology remained the same for the canal

system, the administration of the water evolved and reflected social and political changes. The organizational structure was built on the traditions of both public and private arrangements that vested authority within the urban administration, and required a complex set of formal and informal agreements between all the parties involved. Today all that remains of the canals are traces in the urban landscape yet, for most of the history of the city they were the key to its success and prosperity.

The Early Modern period was one of economic stagnation in northern Italy but also one in which some urban populations benefitted from earlier investments in infrastructure. The politics in Italy shifted to more stable states after the disruptions of the late Medieval and Renaissance periods and that meant, in some cases, a new set of rulers had to create new administrative structures needed to maintain the systems. This particular period of nearly 200 years in some ways anticipated the change to later more rationalized planning regimes. Urban administrators grappled with aging infrastructure, much of which had been constructed in the late Middle Ages, and increased demand from industries, particularly textile production, while often maintaining old, inefficient methods of management. For Piacenza it would take the demise of the direct Farnese dynasty and the shift to new government in 1731 to jolt the city into a different administrative structure, one that addressed the long-term deficiencies of its water and sanitation systems.

1.2 IMPORTANCE OF THE RESEARCH

From an historical viewpoint this material has import because it gives a day-to-day account of urban management during the Early Modern period. Water has always been recognized as critical to human settlements but more recently, with climate change, the issue of water management has gained further significance. Climate shifts today have brought what may be permanent changes to established local and regional hydrological cycles and produce extreme weather events, sometimes drought, or high volume rain or snow events. A warmer atmosphere holds more water and this affects where water is available, in what quantities, and during what months of the year. These new hydrological regimes can bring scarcity to areas that have enjoyed abundance for long time periods. At the same time humans have frequently used water without regard for

conservation or efficient management. The technology of deep pumping allows for the diminishment of ground waters that were never before utilized. Many aquifers have been over-exploited, especially for agricultural irrigation, and can no longer provide for established local uses. Shortages can lead to social tensions and conflicts as humans must have access to water for domestic use, irrigation, and industrial processes. A lack of water over a period of time can lead to disease outbreaks or crop failures and famine. Thus the social management of water becomes as important as the technology employed.

As the issue of water management becomes more significant it has also become clear that we can learn from the past. Historical collection and conservation methods have been revived in some parts of the globe. But there is more to learn from our ancestors. They had to manage water in times of abundance and scarcity. They had to apportion it without the technologies of today in ways that allowed their cities to grow and if possible, minimize health risks. Within these constraints systems were developed to share the water for a variety of uses in a single urban space with the goal of resiliency, often through system redundancies. We can learn from these approaches today as we grapple with changed hydrological regimes, escalating population loads, and increased demands on a shifting and changing resource.

Chapter 3 will show that while research has been done on other water systems and other canal systems in northern Italy, there has been little done on how city administrators actually related to urban inhabitants over the provision of a daily need such as water. This research looks at the more ordinary interactions between residents and officials rather than those from crises such as plague, famine or war. Thus it informs us of how urban officials and residents related to one another in daily life, something that has been missing from our understanding of Early Modern Italy.

1.3 METHODOLOGY

Preparation for time in the archives included reading on the history of Italy and on studies done on the water systems of other northern Italian cities. Then the archives in Piacenza were investigated, especially the documents of the CSO, the committee that oversaw the water utility during the Farnese reign. Other document collections as well as

maps were examined while in the archives. Once the information was collected it was collated where possible into Excel tables by canal and then by year. This allowed information to be extracted to answer various questions about how water was managed in Piacenza.

1.4 THESIS STRUCTURE

Chapter 2 examines the context for the study and begins with the Po River and its watershed followed by the history of the city through the Farnese reign with an emphasis on water management. The context also includes a brief overview of the administration of the whole city and how Piacenza was established and grew in terms of its shape and form. The second chapter continues with a general overview of the of historical water management in Piacenza. It concludes with a description of the canals of Piacenza and the regional politics of the supervision of water. Chapter 3 presents historical research on other cities in northern Italy to understand the varied approaches to the different ecological contexts and constraints faced by urban administrators. This is followed by a list of the sources used for the research into the system in Piacenza.

Chapter 4 moves into an examination of the CSO documents from the archives. The documents are presented and explained with a further investigation of the water system infrastructure and land-uses that are present in the content of the documents. There is further study of the canals as infrastructure, their materials, the means to measure water usage, and how the system was drawn and mapped.

Chapter 5 extends the study of the documents with a survey of the urban space and land-use patterns to construct a landscape ecology for the city. Demographics are added to this investigation to make it more complete. The examination continues with a social analysis of those involved in the water system from ducal governance to individual users. The overall management of the system is explained including the use of experts, costs, taxation, regulations, and penalties.

The thesis concludes with Chapter 6 and a discussion of the value of the archival documents and further questions about Piacenza and by extension similar northern Italian

water systems. It then moves on to consider the wider implications of this work in light of contemporary water management issues.

CHAPTER 2: A BRIEF HISTORY OF PIACENZA AND ITS GEOGRAPHY

This chapter establishes the context of the research into the archival documents. It begins with the geographical environment of the city of Piacenza, its location and relationship to the Po River and the watershed. This is followed by a history of the city and territory with a focus on the development of the water and canal system through political shifts and changes up until the Farnese period. Then the history moves on to account for Farnese rule, the various dukes, the administrative structure of the city, and major events. With the context for the place and time set, in the second section the chapter explores the management of water as it has been practiced by humans over long historical periods and in multiple locations. The third section introduces the canal system for Piacenza and discusses the meta-politics of the region that specifically affected the urban water management.



Figure 2-1: Italy at the end of the 16th century with the duchies of Parma and Piacenza. Highlight added. From: University of Texas at Austin. Cambridge Modern History Atlas, 1912. <http://www.emersonkent.com/map_archive/italy_16th.htm> .

2.1 PIACENZA: ITS HISTORY AND GEOGRAPHY

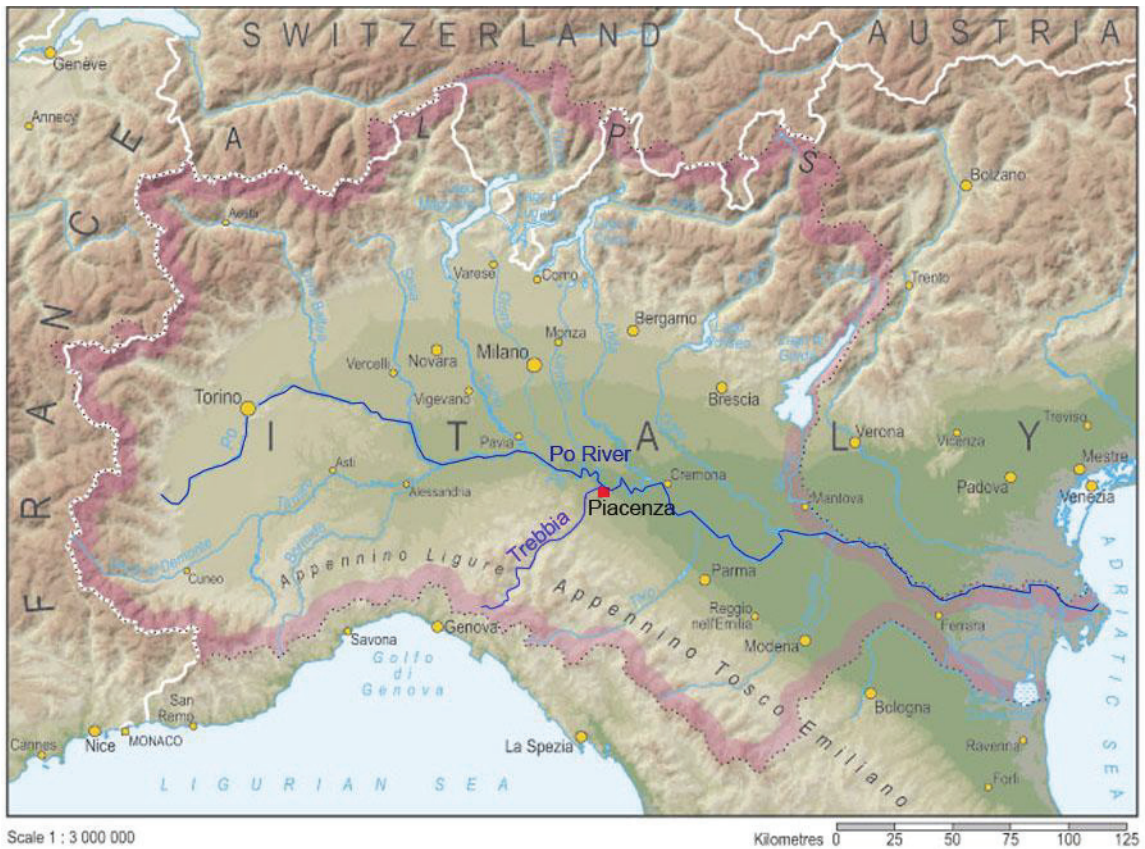


Figure 2-2: Po River valley and watershed with city of Piacenza, and Trebbia River marked. From < <http://www.adbpo.it/on-line/ADBPO/Home.html> > .

In the Pliocene epoch the Mediterranean was formed through the movement of tectonic plates, and what would become the Po River valley was covered with an extension of the Adriatic Sea. As the tectonic plates continued to move together, the mountains rose, and the valley began to fill in with sediments¹. This rich alluvial valley, fed by drainage from the Alps and the Apennines, was buried under repeated glaciers in the Quaternary period². As the glaciers receded deposits of gravel and sand were left

¹ The Pliocene epoch is from 5.3 to 2.58 million years ago and preceded the Quaternary period.

² The Quaternary period begins as a prehistoric period of human history, defined by repeated glaciations, from 2.5 million years ago to today. It includes the Pleistocene that covers from around 2.5 million years ago to the introduction of agriculture around 10,000

behind. This, along with the shifting of faults and the tilting of the area plates, established the contemporary drainage network. These glacial sediments have been overlaid with the complex fill characteristic of an alluvial plain. This plain is a landscape that was modified constantly, as rivers and torrents, including the Po River, changed course in response to silt build up and tectonic events.

Today the Po River basin covers an area of 74,000 sq km primarily in Italy. It rises from Mount Monviso west of Turin and travels 650 km south and east to the Adriatic Sea. There are 141 tributary streams and 450 lakes. The watershed, contained in Italy, France, and Switzerland, has a total population of 17,000,000 people in the present day³. The lowest density population of the watershed is located in the upper part of the Trebbia River and Parma sub-basins in the Apennine Mountains. The Po River discharges into the northern Adriatic Sea with a delta of 380 sq km. This delta is considered one of the most complex estuarine systems in Europe.

The contemporary land uses within the watershed are urban, agriculture, forests, and uncultivated lands. About two-thirds of the watershed basin is mountainous and hilly and about one-third is plain. The primary activity in the plain is agricultural and includes intensive cultivation of rice, grapes, cereals, vegetables and fruits, along with livestock production. Forty percent of Italy's GDP is dependent upon the agriculture, livestock, industry, and tourism connected to the Po River basin. The area contains 37% of the nation's industry and employs nearly 50% of its workforce⁴. The mountains and lower Alpine areas contain forests, pastures and grasslands. The hydrologic ecology of the Po is divided into 3 main areas: the high Po, medium Po, and low Po. Piacenza is part of the low Po, as the Ticino River, the dividing line between medium and low, is just upriver from Piacenza. This lower area is typified by springs and quiet water vegetation.

BCE. The interglacial period of increased human activity from the end of the Pleistocene to today is known as the Holocene.

³ "Drainage Basin of the Mediterranean Sea", UNECE, 158.

<http://www.unece.org/fileadmin/DAM/env/water/blanks/assessment/mediterranean.pdf>> December 2007.

The report places the Po River watershed within the three countries with 0.4% in France, 5.2% in Switzerland and 94.4% in Italy.

⁴ Facts and figures from: "Major European Watersheds," p 64-65.

http://www.grid.unep.ch/product/publication/freshwater_europe.php>.

The average rainfall in the area is between 1000 mm and 1200 mm per year but is unevenly distributed in space and time. More rain falls in the lakes region closer to the Alps in the north side of the watershed. Other areas can suffer droughts in late summer. Due to the uneven rainfall, some areas of the Po River basin are quite dependent upon groundwater and aquifers. The rivers that flow into the Po are fed by glaciers in the Alps and by rainfall and groundwater in the Apennines. The rivers from the Alpine side of the Po River valley tend to be more reliable as they are glacier-fed with a more even flow. Those that flow north from the Apennines, on the south side of the Po River are more variable. The Apennines get less snow and have no glaciers to smooth out the flow rate of its torrents and rivers. The plain, where Piacenza is located, is dependent upon groundwater to make up for uneven flow of the smaller local rivers. Agriculture today is one of the main sources of pollution in the Po River basin. Water quality is affected by urban runoff and agricultural pesticides. Parts of the basin have been marked by subsidence due to land reclamation, use of ground water, and flooding and harbour infrastructures⁵.

Several rivers and torrents flow from the mountains south and west of Piacenza into the Po. The most important one is the Trebbia River, southwest of Piacenza, with its headwaters up in the Ligurian Apennines⁶. It is a larger river which does diminish in the summer but does not go dry. The Trebbia is fed by several torrents and streams as it

⁵ Meri Raggi, Davide Ronchi, Laura Sardonini, Davide Viaggi, "Po Basin Case Study status Report," AquaMoney, based on Po Basin Case Study Report, (Bologna: DEIAGRA, Università di Bologna, Italy, 2007) 9,10,12.

⁶ Is the Trebbia a river or a torrent? A torrent is a stream, often a mountain fed channel that goes from violent, fast moving surges to slow and diminished flows between rainfalls. On older maps it is sometimes marked as a *torrente* but more recent maps label it as a *fiume* or river. The water level and flow of the Trebbia is heavily affected by mountain snows and rain, and it historically often flooded and changed course, especially on the plain. However it does not go entirely dry in the summer. It is also possible that an underground river or subterranean water flows contributes to the volume of water within the Trebbia. Local residents in Piacenza informally assert that it is a *fiume* and not a *torrente* though in terms of its flow variations it is better defined as a large torrent. For the purposes of this research it will be designated as a river/*fiume* to differentiate it from other smaller streams and torrents found in the area.

flows over 110 km to enter the Po just west of the city. Like the Po, it too has changed course a number of times and, at one point, may have been closer to the city. The Trebbia became the main water source for the city of Piacenza until the early 20th century. The other significant river, the Nure, lies to the east of the city. Because the city is essentially uphill of the Nure, it never had the importance of the Trebbia. Nevertheless, canals were constructed to facilitate agricultural irrigation from both rivers into the countryside that surrounds the city. These two rivers can be quite narrow in places, high up in the hills they flow through deep canyons. By the time they reach the lower hills and the plains they are often very wide, with rocky beds that span hundreds of meters and shift from bursting during flood times to only partially full during dry seasons.

The Trebbia watershed is over 1150 square kilometers and is shared by the regions of Emilia Romagna, Liguria and in a very small part, Lombardy. The ecology of the river divides into three areas. The high or upper Val Trebbia is mainly mountainous and subject to landslides. The river winds its way through steep and deep gorges carved out of the old Apennine Mountains. In recent years parts of the watershed have been re-naturalized and reforested and host an increasing population of wildlife that includes wild pigs. At the monastery town of Bobbio the Trebbia moves out of the mountains and into the hills. There, cultivation increases dramatically. Historically, and still today, the hills were the place for cultivation of grapes, fruit and vegetables, and livestock. At the town of Rivergaro the geomorphology shifts to the plain. Since the Trebbia has historically been unstable in its lower course, the delta has built up rich alluvial soils prone to floods. Typically the flat plain was used to cultivate cereals, especially wheat, though corn and tomatoes dominate now. Today the Trebbia is considered a fairly clean river though swimming is discouraged downstream of Bobbio due to bacterial counts. Its flow has been diminished in modern times because of hydroelectric production in the upper watershed⁷.

⁷ Information on the Trebbia comes from Giovanni Giavelli, <http://www.dsa.unipr.it/giavelli/Tesina_Cani/Cani.html>, The people in the Val Trebbia are proud of the landscape and like to remind visitors that Hemmingway once declared it the most beautiful valley in the world.



Figure 2-3: View north from the beach at Confiente, near the headwaters of the Trebbia River, July 2010.



Figure 2-4: On the 280 m long Ponte Vecchio at the Trebbia River at Bobbio, spring 2010.



Figure 2-5: View over Ponte Vecchio at Bobbio to hills on the other side, spring 2010. Bobbio is considered the gateway from the lower valley of the Trebbia to the upper part of the river.

2.1.1 The History of Piacenza to the Farnese era

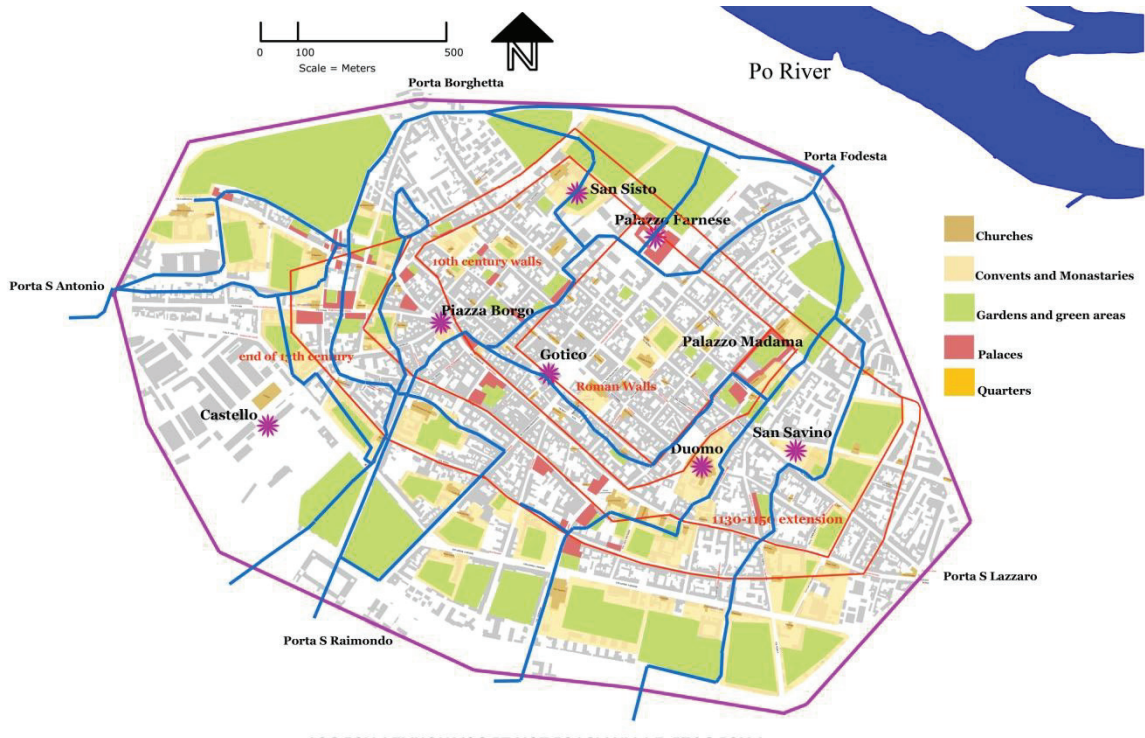


Fig 2-6: Map of Piacenza with progressive wall extensions, Farnese walls (purple), landmarks, palaces, gardens and green spaces, churches and ecclesiastical institutions on contemporary footprint.

218 BCE: Roman Colonization

The confluence of the rivers as they entered the Po originally left low-lying marshy areas. The Etruscan population, which arrived around 600 BCE, drained these areas and began a system of irrigation ditches in order to enhance agriculture. Other tribes chose to reside in the area including the Celts from the 4th century and later the Liguri. In the late third century BCE, Roman colonizers moved up from Rimini (est. 268 BCE) into the valley and founded Piacenza⁸. Brea and Miari date the first Roman colony and founding

⁸ Pier Luigi Dall’Aglio, “L’attuale territorio piacentino in età romana: popolamento e infrastrutture”, *Da Piacenza a Veleia, passeggiate archeologiche piacentine*, eds G. Manfredi, L. Berti, and A. Laeaia, (Piacenza: Fondazione di Piacenza e Vigevano, Tip.Le.Co., 2004), 57-58.

of Piacenza as an urban seat to 218 BCE, with the settlement of 6,000 military families⁹. Piacenza was founded as a sister city to Cremona, another Roman outpost on the north side of the Po River, around 25 km downstream. Piacenza and Cremona were established to oppose Celtic invasions from the north and possibly to add to Roman agricultural production. Maria Pagliani points out that the site for the new city of Piacenza was a good one, due to the fertility of the alluvial soil, the gentle slope of the terrain, and the easy access to water¹⁰. When the Romans arrived, the work of *bonification*, begun by the Etruscans, increased until the flat low-lying areas were drained and criss-crossed with irrigation canals. Drainage of the marshes provided agricultural land and reduced the incidence of malaria and illnesses associated with life on the plain. The city itself was sited on a slight rise in the flat land, on soil known as *terrazzo fluviale*, that is, alluvial deposits from the rivers that had been left over time.

Pronti attributes the meaning of the name ‘Piacenza’ to the desire to avoid the use of either a Celtic or Etruscan designation. Piacenza comes from the Latin term for ‘pleasant’ and is considered an auspicious name such as Fidentia, and Valentia (Confidence and Vigour)¹¹. The name connotes the site as prosperous, a place of well-being and beauty. It was a name meant to attract settlers with a promise of the good life. In the same year Piacenza was founded Hannibal crossed from Spain into the valley. The first major battle of the 2nd Punic War took place just to the west of the settlement, at a ford across the Trebbia River in December. Rome lost, and its troops retreated back to Piacenza. After that defeat, hostilities towards the Romans increased from the native Celtic population. Because of the casualties there had to be a significant resettlement of Piacenza in 197

⁹ Authors vary in the dating of the initial Roman colonization. Some postulate 218 BCE and others 219 BCE. I have elected to use the 218 BCE date, as that is the date the current city government uses on its website. See Maria Brea and Monica Miari. “Preistoria e protostoria del Piacentino.” in Da Piacenza a Veleia, passeggiate archeologiche piacentine, eds. G. Manfredi, L. Berti, A. Laeia, (Piacenza: Fondazione di Piacenza e Vigevano, 2004), 9-28.

¹⁰ Maria Luigia Pagliani, Piacenza, Forma e Urbanistica, Città Antiche in Italia, (Roma: L’erma di Bretschneider, 1991), 41.

¹¹ S. Pronti, ed. Piacenza nella storia, dalle origini al XX secolo, (Piacenza: Tip.Le.Co, 1990), 61.

BCE of 2,000 families and a garrison¹². At that time, the hills were more productive in terms of agriculture than much of the plain due to the number of marshes in the lower region.

The main road through the city was first constructed in 187 BCE and connected north Italy to Rome. It was called the Via Emilia (today Via Roma in Piacenza). The Romans also made use of the Po River for travel and to transport hay, marble, and salt between ports. Some of the nearby watercourses, like the Trebbia River, are navigable at least for a short distance, while the Po River allowed travel from its mouth in the Adriatic Sea northwest to Turin. A port was established at Piacenza between 170 and 150 BCE. With the close proximity of the Po River and the Trebbia the exact location of the Roman port is unclear. Pagliani locates it to the west of the city at the base of the Roman-built Fodesta canal near the mouth of the Trebbia though since the Fodesta was navigable boats may have offloaded closer to the city¹³. In 148 BCE, the Romans opened a new road, known as the Postumia from Genoa through Piacenza to Cremona to aid troop movements. With such rich soils in the flood plain, the colony was practically self-sufficient and became an important part of the Roman food supply.

According to Pier Dall'Aglio the Romans made a significant and lasting impact on the territory. Roman policy promoted intensive agriculture on the colonized land and reshaped it to suit their needs. Wetlands were drained, so new agricultural plots could be allotted. The natural water network was channelled into canals and dams for irrigation, in a process called *centurizione*. While the cultivation was diverse, it contributed to deforestation. In the plain, where farms and small villages were established, ancient bricks can still be found. The Romans valued this region for its agricultural production and invested in infrastructure to enhance its fruitfulness. Despite the collapse of the

¹² Pagliani dates the resettlement to 190 BCE when new colonists were needed to replenish a population diminished by 30 years of war. Pagliani, Piacenza, Forma e Urbanistica, 14.

¹³ Ibid., 78.

empire Dall'Aglio claims that the original Roman approach to agriculture affects the landscape even today and supplies many of the place names¹⁴.

After the 3rd century, despite deterioration and decline, Piacenza was able to build its first important Christian church, the basilica San Antonino, dedicated to the city's patron saint, just outside of the Roman walls in 350. Out in the countryside more changes occurred with increased economic instability. Heavy taxes and inflation drove out the small farmers, and land ownership became concentrated. Rome's organized structures and infrastructure broke down¹⁵. War and economic downturn meant that critical urban infrastructure was not maintained. Consequently, the city suffered recurring floods from the Po River. At one point, a miracle was sought. Bishop Savino of Piacenza (381-420) reportedly used prayer to throw the floodwaters back into the Po River, when the city's well-being was threatened¹⁶. By the 5th century, parts of the countryside had been abandoned and incomes were low¹⁷.

¹⁴ Dall'Aglio, "L'attuale territorio," 58-59.

¹⁵ Ibid., 62.

¹⁶ R. Schumann, "Le fondazioni ecclesiastiche e il disegno urbano di Piacenza tra il tardo periodo romano (350) e la signoria (1313)." Bollettino Storico Piacentino, 71(1976):166.

¹⁷ Dall'Aglio, L'attuale territorio, 63.

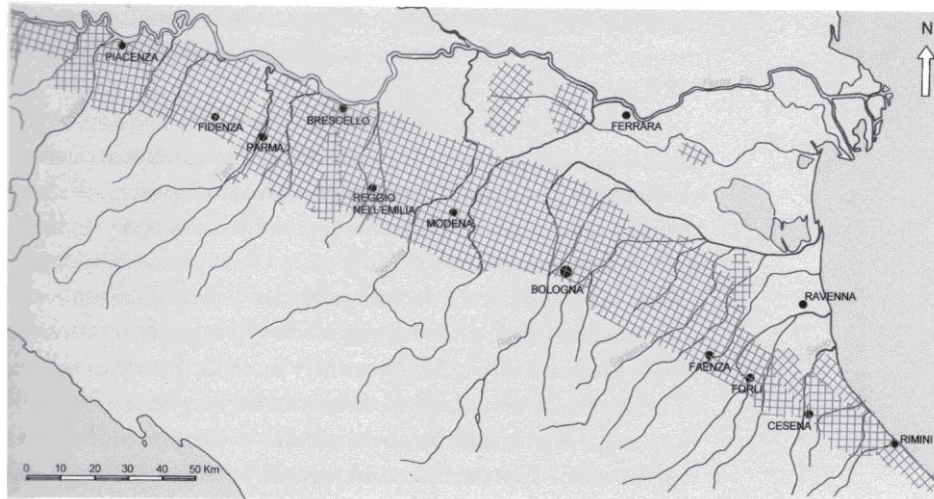


Figure 2-7: Map of region bearing traces of *centuriazione*, with principal towns and cities. The grid represents the extent of Roman engineering through drainage and irrigation canals to make the landscape more agriculturally productive. Brizzi, Giovanni. “Gli eventi.” in *Da Piacenza a Veleia, passeggiate archeologiche piacentine*. eds. G. Manfredi, L. Berti, A. Laeaia, 29-54. Piacenza:Fondazione di Piacenza e Vigevano, 2004, 39.

476: After the Roman Empire to the *Comune*

Piacenza was sacked in 476 after Rome fell, and continued to endure multiple incursions for many years. Throughout this period, the city remained the commercial centre of the district, but the population dropped due to the economic disorder. The Lombards, originally a Germanic people, arrived from the north in 568 and took control of the region which ended the invasions. This encouraged the rise of powerful families from the countryside, who then sought to have power over the city and its wealth. As the city shrank in size, it was divided up between churches and ecclesiastical institutions that continued to grow in strength¹⁸.

Schumann cites Piacenza as a city ideally suited for growth after the disruptions that followed the fall of the empire¹⁹. It was a city sited, simply due to its geographic

¹⁸ Paola Galetti. *Una campagna e la sua città, Piacenza e territorio nei secoli VIII-X*, (Bologna: Cooperative Libreria Universitaria Editrice, 1994), 55-60.

¹⁹ Schumann. “La fondazioni ecclesiastiche”, 159-171.

location, to take advantage of any new commercial traffic and later that of religious pilgrims. The churches began to use the depopulated neighbourhoods as an opportunity to expand their compounds, gain critical resource rights, and exercise their power to determine the management of the city. These moves would come to fruition in the centuries to come. Yet life was difficult following the fall of the empire. As a consequence of the war in the second half of the 6th century, watercourses were forsaken, the irrigation network drained, and the area began to reforest. Nevertheless, during this time the church San Martino in Foro (est. 410) was built at the old Roman forum and the first female convent, San Siro (est. 550), was built outside the city walls, to the southwest of the city.



Figure 2-8: San Martino in Foro today. While the door in the photo faces a small piazza, formerly part of the Roman forum, now primarily used as a parking lot, it is not actually the entrance to the church. The church was given to the Ursuline Sisters who resided in the convent just to the east of the church. The entrance now is through the convent.



The ancient churches (founded between the 4th and 8th centuries) and the burial places from post-Roman to the high Middle Ages, inside the walls and in proximity to the urban edge.

Legend: ● Church ▲ Burial place

1. Santa Liberata, 2. S. Martino in Foro, 3. S. Pietro in Foro, 4. S. Silvestro, 5. S. Michele, 6. S. Maria in Cortina, 7. S. Antonino, 8. S. Apollinare, 9. S. Ambrogio, 10. San Savino.

Figure 2-9: The Roman city of Piacenza is the shaded area marked with later Christian churches and sites up to the 8th century. The churches located outside the walls are still very close for security purposes. M. Pagliani, Piacenza, Forma e Urbanistica, 83.

By the 7th century, abandoned parts of the territory were resettled but in the centre of Piacenza, the steady construction of new churches helped destroy the old Roman city, both spatially and materially. Materials were reused in the new churches, which turned the older centre into a ruin. Pierre Racine notes that the Roman Fodesta canal from the Trebbia River, which had fallen into disrepair, had already been renewed and rebuilt under Lombard rule²⁰. The 8th century was a turning point for Piacenza, as the Lombards were followed by the Carolingians when Charlemagne invaded in 773-4, since the Carolingians ruled with a much stronger urban vision and administrative models²¹. The new rulers brought with them new aristocrats from the area of France to settle the territory²². With an increase in population and economic development, water rights became very important.

With the decline of hostilities and the reconstructed infrastructure people began to travel. The *Via Francigena* ran from northern Europe to Rome and went through Piacenza. Religious pilgrims travelled through Piacenza for many centuries and would have a significant impact on the urban economy and spatial form. Religious tourism, with the need for hostels and places to supply and care for the visitors, was to become an important source of income for the town and the surrounding region. The increased economic prosperity allowed for the renewal of public roads and repair of water channels. New churches, convents, and monasteries began to proliferate across the urban suburbs²³. The city shifted away from the Roman intersection of the *cardo* and *decumanus* as the

²⁰ Pierre Racine, *Plaisance du X^{ème} à la fin du XIII^{ème} siècle: essai d'histoire urbaine*, tome 1. (Lille: Atelier Reproduction des thèses Université di Lille III, Paris: diffusion H. Champion, 1980, c 1979), 13-14.

²¹ Charles Killinger, *The History of Italy*, The Greenwood Histories of Modern Nations, eds. Frank Thackeray and John Findling, (Westport, Connecticut, Greenwood Press, 2002), 52. Charlemagne ruled in absentia but returned in time to be crowned Emperor by Pope Leo III on Christmas day in 800. He and his immediate successors would rule most of north and central Italy for only the next 70 years.

²² Racine, *Plaisance*, 39. C. Killinger, *The History of Italy*, 52, does not support this in his description of the Carolingian rule. Instead he characterizes it as lax and with little impact on the lives of the local populace.

²³ Killinger, *The History of Italy*, 53. He notes that later Carolingian rulers came to depend upon private armies led by counts and bishops to defend Frankish Italy.

new suburbs stretched to the south and to the west with expansion to the north blocked by the Po River, woods, and a marsh²⁴.



Figure 2-10: View of the Via Francigena from Canterbury to Rome as it crossed through Europe marked with major towns and cities. Piacenza is just north of Parma on the map. This is the route pilgrims took to and through Piacenza. From Piacenza pilgrims could travel down the Via Emilia towards Bologna and then turn up into the mountains to the Ciso pass, or go visit the monastery at Bobbio up the Trebbia Valley and from there to Rome. <<http://compostela.pellegrinando.it/sezioni.php?seid=1920>>.

Angliberga, consort of Lodovico II, a Frankish king, founded the monastery of San Sisto in the northwest section of the city, with extensive water rights and a mandate to

²⁴ Giuseppina Piccinini, Il Palazzo Gotico. Le vicende del Palazzo Pubblico di Piacenza dal 1281 (Piacenza: Edizioni Tip.Le.Co, 1998), 49. This is one of a number of texts that mention marshes in the delta of the rivers leading to the Po in the area. Due to the movement of the Po River channel, there were at times, marshes between the city and the Po, especially to the north. Note that in Roman planned towns and cities, the *cardo* was the north/south street and the *decumanus* was the generally secondary east/west street. The forum was located at the intersection of these streets.

house 24 pilgrims²⁵. San Sisto acted as a critical institution for pilgrims and travel on the Po River. The monastery was given the rights to trade in the *strade* (streets) and to build waterworks that would benefit the institution²⁶. Valeria Poli gives the founding date of the monastery as 852, with a concession for a fair given on 28 May, 896, and she notes that the institution also had control of the Po River port. Racine observes that San Sisto owned the rights for passage between the Po River and the Trebbia, which was navigable near its mouth²⁷. The establishment of San Sisto actually created the urban neighbourhood of San Leonardo as part of an urban expansion²⁸. The founder also paid to repair a stone bridge that crossed the Trebbia River, which directed travellers onto the road to San Sisto. San Sisto became the new centre of travel on that part of the Po River²⁹.

²⁵ Thomas Szabó, "Le vie terrestri di Piacenza." Mercanti e banchieri Piacentini, Percursori di Cristoforo Colombo nel mondo durante il Medioevo, Atti del convegno Internazionale di Studi Auditorium Cristoforo Poggiali, Piacenza, 10-12 settembre, 1992. (Bologna: Edizioni Analisi, 1994), 34.

²⁶ Anna Zaninoni, "Ponti, Guadi, Porti. I diritti d'acqua del monastero di S. Sisto di Piacenza tra XII e XVI secolo," Bollettino Storico Piacentino 94.2 (1999): 251-273. On page 252, Zaninoni cites what she believes is a false document, a diploma of 874 in which Emperor Ludovico ceded rights to the monastery and the right to build new aqueduct from Po, 'as in ancient times'.

²⁷ Racine, Plaisance 81.

²⁸ Valeria Poli, "Il sistema delle acque nella storia urbana di Piacenza" in Archivio Storico per le Province Parmensi, vol LX, (2008): 334.

²⁹ Schumann, Le fondazioni ecclesiastiche, 159-171.

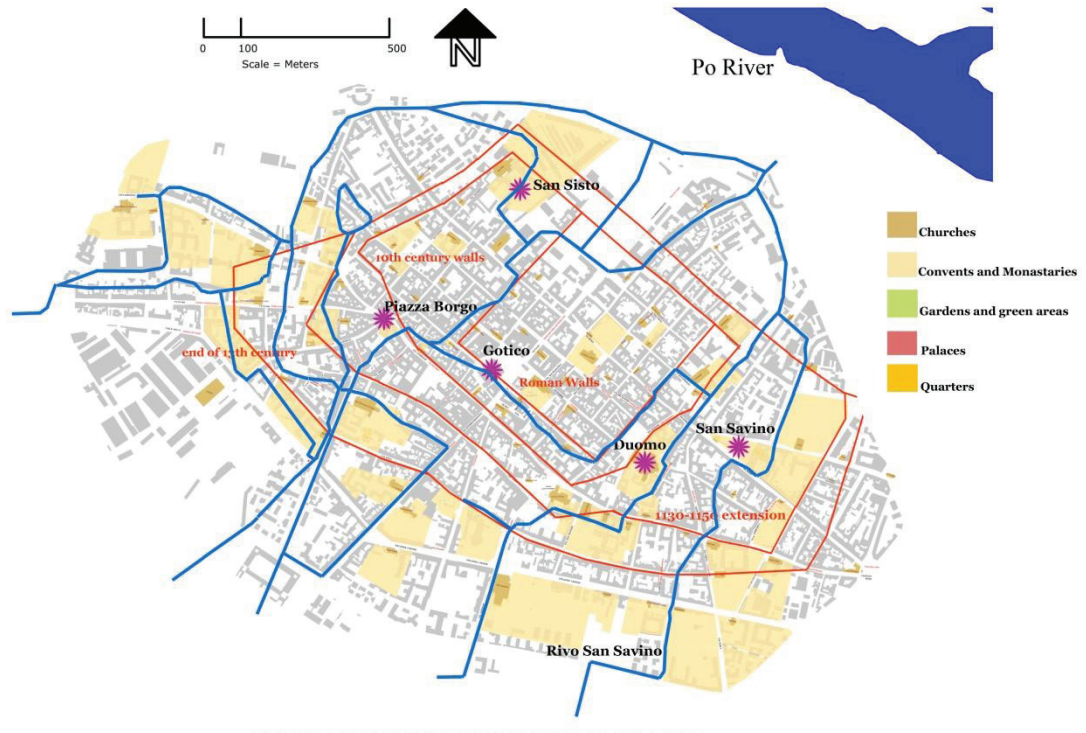


Fig 2-11: Map of Piacenza with major medieval landmarks on contemporary urban footprint. These include San Sisto, San Savino, the Duomo, Piazza Borgo and the Gotico, canals, major convent and monastery properties and city walls to the end of the 13th century.

Anna Zaninoni argues that many of the documents used by San Sisto to support its water rights in disputes against the convent of Santa Giulia di Brescia are of dubious authenticity. There were fights over control of fishing spots on both sides of the Po, ownership of ports and slipways, rights to build new canals and waterworks, to control bridges, collect revenues from traffic on the Po River, and to confer water rights on vassals. Various conflicts went on between San Sisto and other churches, the bishop, the city, and the distant emperor for several hundred years³⁰.

The kinds of rights involved in such conflicts were diverse as they could include many different activities. One set of rights allowed for the construction of canals, often for irrigation. Water could then be sold to local farmers along the way. The Fodesta, the

³⁰ Zaninoni, “Ponti, Guadi, Porti,” The article covers the many disputes and court cases over water rights that involved San Sisto.

navigable canal for the city, involved the right to control the urban port and gain the revenues from its use. Also possible were rights to fish along portions of waterways and to use the reeds that grew in the marshy areas. Associated rights that produced revenues were those to bridges that crossed natural and human-made waterways, and the use of water for mills. It is easy to see that jurisdictions and rights to a single body of water could become quite complicated over time with owners, tenants and sub-tenants who engaged in a multiplicity of activities made possible by the water supply.

Schumann describes the city of Piacenza as divided into three zones by the second half of the 9th century. The first was the old Roman city, at that point in ruins; second was the bishop's city in the south end connected to the new cathedral, Santa Maria and Santa Giustina begun in 856, and third was the imperial city to the west which would have included new monasteries and San Sisto. Schumann sees San Sisto, as a fusion of all three, which turned it into a fulcrum of power for the city³¹. It is estimated that in the 9th century the city walls enclosed about 45 hectares and held up to 9,000 inhabitants with a density of around 50 houses per hectare³². The 9th century had been one of new power and wealth for local families. A number of these families carved out new autonomous zones for themselves in the valleys and mountains around the city.

The Carolingian system waned in power by the mid-10th century. This ultimately led to centuries of power struggles between groups at every level of government, local to international, from city officials to the church to the emperor³³. By the 10th century a new local governance model had emerged that reinforced the rule of local bishops in the Veneto, Emilia, and much of Lombardy. The city began this period still in recovery from the years of war and demolition of the urban core. The ancient Roman core was reduced to rubble, with sections of it used for urban agriculture. While the network of Roman roads was preserved, in part, new institutions, especially churches, moved to the edge of the city where there was more free land. San Savino, a monastery that would become a major landowner in the countryside, was rebuilt in the early 10th century after it

³¹ Schumann, *Le fondazioni ecclesiastiche*, 159-171.

³² *Storia di Piacenza, dal Vescovo conte alla Signoria (996-1313)*, vol 2, (Piacenza, Cassa di Risparmio di Piacenza, 1984) 31-35, 55.

³³ *Ibid.*, 42-48.

was destroyed in the Magyar invasion. San Savino had control over much of the water and irrigation that ran from both the Trebbia to the west and the Nure to the east. Maria Cademartiri documents the acquisition of various water rights, especially to canals, by the monastery over many years. One of the results of the many rights to water was the canal named after the monastery, Rivo San Savino, which ran through the countryside to the southwest side of the city³⁴. Paolo Squatriti notes that these private and monastic canals became a trait that distinguished the wealthy ecclesiastical institutions from the 8th century and beyond³⁵. The large convents and monasteries built the canals for their own convenience and to enhance their prestige.

Due to its location, Piacenza became a transit point of international commercial traffic with spices, jewels, and other precious objects transported through the city. Merchants participated in local fairs, and ultimately in more international fairs further from the city³⁶. Piacenza was connected by trade to the permanent market in Pavia where slaves and arms were sold for precious goods from the east³⁷. Therèse De Paulis comments that there were three major travel routes, the first was the *Via Francigena* (see figure 2-9), which took pilgrims over the Apennines, through Tuscany, and on to Rome; the second was the route through the Trebbia River valley up into the hills, to the port city of Genoa and the Mediterranean beyond it; and the third was the Po River itself which could be travelled to the Adriatic³⁸.

³⁴ Maria Cristina Cademartiri, “Lo sfruttamento delle acque nel piacentino tra XII e XIII secolo: l’ esempio delle proprietà del monastero di S. Savino,” Bollettino Storico Piacentino 82.1 (1987): 72. Cademartiri also makes use of the *Registrum Magnum* and the *Archivio Capitolare della Cattedrale di Piacenza* as well as the *Inventarium Ruffini* (Ruffinus Camararius Monasterii Sancti Savini) and the *Inventarium privilegiorum et instrumentorum* (at the Biblioteca Comunale Passerini Landi).

³⁵ Paolo Squatriti, Water and Society in early medieval Italy, AD 400-1000, (Cambridge: Cambridge University Press, 1998), 19.

³⁶ Therèse De Paulis, “Plaisance et les voies fluviales” Mercanti e banchieri Piacentini, Precursori di Cristoforo Colombo nel mondo durante il Medioevo. Atti del convegno Internazionale di Studi Auditorium Cristoforo Poggiali, Piacenza 10-12 settembre, 1992 (Bologna: Edizioni Analisi, 1994): 51-67.

³⁷ Racine, Plaisance, 76.

³⁸ De Paulis, “Plaisance et les voies fluviales,” 53.

As the city changed, so too did the countryside. Paola Galetti discusses how, by the end of the 10th century, the landscape served the large religious institutions and feudal families. The deeds used to make gifts of land to religious institutions distinguished between natural pastures and those that were irrigated as water rights could be inherited or sold. Water rights were well-documented by references to wetlands, islands, water rights of usage for reeds, fishing and hunting, and descriptions of banks and canals. There were also artificial ponds for fish farming³⁹. There was little public or common land; most of it was private and in the hands of rising feudal nobles or the church⁴⁰.

There were conflicts within the church and between church institutions, between the church and imperial authority, and between political factions which arose within Italian cities. The conflicts began at the very highest levels, as the papacy and the emperor were at odds with one another, especially on the issue of authority to invest ecclesiastical offices such as bishops and abbots. This gave rise to the two factions that dominated politics at local and regional levels for centuries; these were the *Guelfi*, the party that advocated for papal supremacy, and the *Ghibelline*, the partisans of imperial power. The two jurisdictions of the Pope and the Holy Roman Emperor, who was based in Germanic lands, overlapped and disputed with one another in areas such as water rights. A monastic organization like San Savino was granted various water rights sometimes by imperial diktat and other times by papal decree⁴¹. Nobles, the populace, and the church split between the two overarching factions, as the international power struggle played out.

Cities were often issued diplomas with official governance rights by the emperor. Piacenza, as a city government, had been late in obtaining its official rights over the city and suburbs, which were finally granted in 997⁴². This did not settle contested rights and spaces, as other institutions, often convents and churches, enjoyed water rights or rights

³⁹ Squatriti, *Water and Society*, 104. He includes an extensive section on medieval fisheries management.

⁴⁰ Galetti, *Una campagna e la sua città*, 106-122.

⁴¹ Cademartiri, "Lo sfruttamento delle acque," 74.

⁴² The word *comune* refers to a town, village, or city, and to the municipal administration structure of the settlement. It also defines a city-state structure, which is what Piacenza was in the process of becoming with the imperial grant.

to tax travel with tolls over bridges that conflicted with city authority⁴³. Valeria Poli points out that the city defined a distinction between the city and the suburbs with a radius of a mile around the city under urban administration⁴⁴. In this way the city extended its power over the immediate countryside.

In the 11th century, some of the residential facilities included courtyards and gardens with wells for private water provision⁴⁵. Ecclesiastical institutions were established along what became Strada Levata (today Via Giuseppe Taverna) on the west edge of the city, an area that ultimately also contained many industries and mills due to the access to the canals. The important church and monastery of Santa Maria di Campagna, on Via Campagna in that part of the city, was established in the year 1000. Its name puts it outside the city walls until the extension was completed in 1525. San Sepolcro, in a reconstruction from its earlier organization, was established in the mid-11th century. It was a large monastery in the western part of the city that also hosted a hospital and orphanage, as well as its own mill, all serviced by a canal⁴⁶.

Ivo Somma picks up the tale about church leaders in the city. Focused on a single bishop, Dionigi, who was in and out of power from 1048 to 1082, he tracked the powerful partnerships between the bishop and the city, other churches, the pope and imperial authority. Dionigi came to power in partnership with the empire rather than papal authority. He used this authority to exercise control over the urban infrastructure. Along with the construction of new monasteries and churches, went the grant of rights

⁴³ Pierre Racine, “Aux origins des *Communes* lombardes: le cas de Parme et Plaisance.” *Bollettino Storico Piacentino*, 72.2 (1977):180.

⁴⁴ Poli, “Il sistema delle acque,” 332.

⁴⁵ *Storia di Piacenza*, 31-35, 55.

⁴⁶ Armando Siboni, *Le Antiche Chiese Monasteri e Ospedali della Città di Piacenza (aperte, chiuse, scomparse)*, (Piacenza: TEP Banca di Piacenza, 1986). Strada Levata ended at Porta San Antonio, churches associated with that part of the city were, in order of founding: SS Nazario e Celso (est. 1000, parish church), Santa Maria di Compagna (est. 1000, monastery), San Martino in Borgo (est. 1000, parish), Santa Vittoria (est. 1030), San Sepolcro (est. 1055, monastery), San Bartolomeo Vecchio (est. 1096, convent), San Giacomo al Ponte Trebbia (est. 1110, hospital), San Antonio outside the walls (est. 1172, hospital and convent), San Antonio in the walls (est. 1172, hospital), Santa Maria di Galiela (est. 1229, convent) and Santa Maria di Valverde (est. 1292, convent).

over land, water, and water-based infrastructure. For example, in 1050, Bishop Dionigi gave San Savino three mills, just outside city walls near the gate called Porta Nuova. In 1058, the same monastery was granted a canal drawn from the Nure, east of the city, and was given the rights to fish in it⁴⁷.

By the end of the 11th century, Piacentini politics had been factionalized between two local groups, the *milites* and *pedites* (or *popolares*). There is some murkiness as to how the larger loyalties were divided, but ultimately, the *milites* appear to have been more representative of the nobility and knights, and the *pedites* of the merchants, artisans, and rising professionals. This local factionalization was influenced by the larger struggles between the emperor and the church, and the struggle of both with the emerging feudal nobility⁴⁸. The city had already become factionalized in the larger spatial sense with the disputes among major noble families. Racine places the Da Fontana in the northwest quarter with the Landi to the northeast. The Anguissola were in the southeast and the Lomello and Pallastrelli with the addition later of the Scotti were to the southwest⁴⁹. Generally, the *Guelfi* resided to the west and the *Ghibelline* to the east. The advent of these families in the urban space challenged the strength of church institutions⁵⁰. Because the city was spatially divided between factions it meant essentially every urban resident, by virtue of his/her location was part of a faction. Presumably the advantage of participation in factional politics was a way to get ahead, gain power and position or just a sense of security. At the international level both the Emperor and the Pope were inclined to grant rights and privileges, such as water rights, to institutions and individuals. Allegiance to the party in power would have been a means to gain access to resources and their use.

⁴⁷ Ivo Somma, “Un vescovo e la sua città nella lotta tra papato e impero: Dionigi di Piacenza (1048-1082?)”, *Bolletino Storico Piacentino* 1(1999): 35-63.

⁴⁸ Racine, *Aux origines*, 180.

⁴⁹ Several of these families were still around when the Farnese arrived in the 16th century. The Landi were heavily involved in water infrastructure, and both Scotti and Anguissola were present on the city council and on the *Congregazione sopra l'ornato*. All of them were multi-branched, titled aristocratic houses.

⁵⁰ Pierre Racine, “Il paesaggio urban di Piacenza nel medioevo (sec. X-XIII)”, *Archivio Storico per le Province Parmensi*, 33 (1981): 227-241.

1126: THE *COMUNE* GOVERNMENT

Dorothy Glass writes on the church in Piacenza, in the 11th and 12th centuries, and explores the power relationships between the bishops, and with the pope, in relation to the drive for church reform⁵¹. She notes that in 1075, Pope Gregory VII removed the imperial-leaning Bishop Dionigi from office and in 1088 Pope Urban II restored papal relations with the city. In 1095, Pope Urban II attended the Council of Piacenza which lends credence to the understanding that Piacenza had been a site of extraordinary significance since well before the late Middle Ages, due to its location and size⁵². It had a prosperous economy, mainly because of textile production⁵³. Bishops were actively involved in the economy, through major land ownership in the city and in the surrounding countryside. Glass, however, describes a church divided by strife and buffeted by the larger struggles between popes, antipopes, and the emperor. Despite the quarrels, churches and monastic foundations continued to be built. The reconstructed San

⁵¹ In the Catholic Church there are two kinds of clergy – regular and secular. Regular clergy are those under a monastic rule. Secular clergy, often those who served in parish churches, were not under monastic rule. The difference could create issues of authority and power. Bishops are a part of the hierarchy of secular clergy but monastic organizations could accrue tremendous power through their wealth and patrons. Since the goals of the two types of clergy could be quite different, conflicts could arise between them.

⁵² Dorothy Glass, “The Bishops of Piacenza, their cathedral, and the reform of the church,” The Bishop Reformed, Studies of Episcopal Power and Culture in the Central Middle Ages, ed. J. S. Ott and A. T. Jones (Surry UK: Ashgate Publishing, 2007): 219.

⁵³ From the Middle Ages, Italians imported much of their wool for textiles from England and then later, with the breeding of Merino sheep, from Spain. Later, in the 15th century they also developed a local silk industry and worked with locally grown hemp and flax. Cotton was imported from Egypt. For more on imported wool see John Munroe, “The woollen cloth industry in Italy: The rise, expansion, and decline of the Italian cloth industries, 1100 – 1730 “, Published in: Il Rinascimento italiano et l’Europa, vol. IV: Commercio e cultura mercantile, 14 (2007): 105-141. For more on the development of the cotton textile industry in Piacenza, see Racine, III paesaggio urbano, 227-241.

Savino, still outside the walls, was consecrated in 1107⁵⁴. And a reconstructed cathedral, Santa Maria Assunta, was begun in 1122 after an earthquake destroyed the earlier one⁵⁵. In the midst of this ecclesiastical instability the city began to gain its own power.

The struggles within the church would later generate new heresies and urges toward reform. In Piacenza this movement was connected to water rights issues. Between 1177 and 1185, a former Consul of the city named Speroni led a movement that rejected all clergy, the sacraments, and church authority⁵⁶. Part of his motivation was a legal case opposed by the Pope, in which Speroni was involved, about water rights for Santa Giulia di Brescia. His movement outlasted him and was a force in the city for 50 years. It was both a part of and a contribution to the anti-church movement that also gave rise to the new city government. Malcolm Lambert places this anti-clerical sentiment as part of a larger movement in Lombardy at the time. The social mobility and change at the time led people to question orthodoxy and to adopt alternative teachings. He notes too that the *Ghibelline* faction was open to anti-papal teachings and there was a natural affinity for unorthodoxy and allegiance to the empire rather than the church⁵⁷.

Like cities across Europe, the new urban government evolved over a period of time especially from 1090 and the new concords with the emperor. However Racine dates the establishment of the *Comune* as early in the 12th century⁵⁸. The author of *Storia di*

⁵⁴ *Ibid.*, 225. Pronti, *Piacenza nella storia*, 130, adds that the monastery would end up owning around 2,400 ha scattered across the city and the countryside by the end of the 12th century.

⁵⁵ *Ibid.*, 176. The cathedral begun in the 9th century is actually dedicated to two saints, Santa Giustina on the lower level and Santa Maria Assunta on the upper level. This is a different building from San Antonino, the original basilica of the city founded in the 4th century.

⁵⁶ Robert Bellosta "Le 'squadre' in consiglio: assemblee cittadine ed elite di governo urbana a Piacenza", *Nuova Rivista Storica*, 87 (2003): 1-54, comments that the *Consiglio*, or the governing council was the heart of political power in Piacenza in the 15th century. Since the *Registrum Magnum* refers to consuls from the 13th century it is clear that a governing city council was established along with the *Comune* and individuals were known as consuls. The reforms in the 15th century would reduce the number of consuls from a high of 600, 100 per city gate.

⁵⁷ Malcolm Lambert, *Medieval Heresy: popular movements from the Gregorian reform to the Reformation*, 3rd edition, (UK: Blackwell Publishers, 2002) 86-88.

⁵⁸ Racine, "Origines and Paesaggio".

Piacenza concurs and stresses the time frame between 1115 and 1126⁵⁹. The *Comune*, as a legal entity, was first documented in 1126⁶⁰. New walls were begun in 1133 and work was done again later in the century which extended the control of the urban administration over existing canals and mills⁶¹. According to Racine the city was intent on the development of a network of mills to supply the urban population⁶². The first recorded transactions for water by the new civil government are in 1147 in the *Registrum Magnum*. In #86 the city Consul negotiated on 10 November of 1147 with the church of San Antonino for the water that came into the city and for the right to create a canal⁶³. Entry #85 notes that on 7 December of the same year, the city Consul negotiated with the Church of Santa Maria and Giustina (the cathedral) for the water in the city ditch from the bridge of San Stefano to the bridge of Porta Nuova, and for a mill. The church had to pledge that the water flow would not be diminished by their usage presumably so that other mills would not suffer and that the city ditch remained of sufficient depth⁶⁴.

The control over resources outside the city walls was vital to the life of the city. From the countryside came water and food, and many of the materials that aided in the urban production processes that created wealth for the city. In the countryside the feudal lords reigned supreme. They owned the water rights for mills and presses in their fiefs and controlled the vital access that allowed food production and processing. What land was not controlled by feudal lords was owned by church institutions and used for their own

⁵⁹ *Storia di Piacenza*, 73.

⁶⁰ Glass, "The Bishops of Piacenza," 221-224.

⁶¹ *Storia di Piacenza*, 94.

⁶² *Il Registrum Magnum*, vol 1, Dotta A Onffri ed. intro by Pierre Racine, (Piacenza: Cassa di Risparmio di Piacenza, 1984) p LIV and LV. The register, in this edition, is in Italian.

⁶³ *Ibid.*, 176-178. Entry #86, 1147 Nov 10 Piac: I consoli Rogerio di Sartorano, Raimondo Sperone e Ranaldo Seccamelica danno al chiesa di S Antonino, nella persona del preposito Oddone, l'acqua che viene alla stessa chiesa <per burgum civitatis Piacentie> e per la strade Romea, e vi aggiungono dell'altra acqua <que venit per Burgum> si da formare un canale.

⁶⁴ *Ibid.*, 174-176. Entry #85, 1147 Dic 7 Piac: I consoli piacentini Rogerio di Sarturano e Raimondo Sperone danno alla Chiesa di S Maria e Giustina, rappresentata dal preposito Giovanni, tutta l'acqua del fossato cittadino, dal ponte di S Stefano al Ponte di Porta Nuova, per dei molini e per ogni altro uso, a condizione che la robustezza del fossato non ne sia diminuita.

agricultural production. Such rights were a source of revenue for the institutions, as they bought the concessions cheaply from the city and then resold them to other buyers or leased them to tenants. The city sought to gain the water rights, and all sought to increase agricultural production through a more intensive use of irrigation water channelled from the Trebbia, Nure, and other rivers. Water was essential for agriculture during the dry summers and to power the mills⁶⁵. At the same time, according to Cademartiri, consortia proliferated with authority over water infrastructure. The people who made up the associations were charged with development of the water channels but rights had become confused and unclear⁶⁶.

Another of the early struggles for the city government was control over urban resources and infrastructure inside the city walls. The churches and convents had control of the mills and ovens and kilns, vital facilities for the longed-for industrial development of the city⁶⁷. San Savino exercised its water rights directly through the monastery and through organized consortia. By 1166, the monastery had jurisdiction over five canals⁶⁸. The city chose to partner with the large ecclesiastical institutions to economically develop the urban resources. In 1170 the city made an agreement with San Savino to further develop urban infrastructure with 20 mills, ten for the monastery and ten for the city⁶⁹.

⁶⁵ Storia di Piacenza 100-101.

⁶⁶ Cademartiri, “Lo sfruttamento delle acque”, 82.

⁶⁷ Ibid., 78. The word *forno* can be translated as a kitchen stove but also as an oven for baking bread, curing bricks and pottery, or as a furnace for melting metals. Bricks were produced on the north end of the city near the Fodesta canal.

⁶⁸ Ibid., 80.

⁶⁹ Ibid., 81. This raises the question of the date that certain canals, especially Rivo San Savino, were actually constructed. In a paragraph that contains the date 1180 Cademartiri quotes a document that provided a concession to San Savino for “rivi San Savino, Iudeo, Merdario, dei Ferracani, dal rivo di Oberto Jutus” but she fails to give the date of the specific document, although this indicates that Rivo San Savino was an early waterway. Cademartiri describes Rivo San Savino with its origin in Rivo Piccinino, one of the two arms of the city’s water infrastructure at Colonna and that Rivo San Savino was actually united with Rivo San Lazzaro and mentions the date 1180. Another document from 1108 contains the concession of the Abate of San Savino to the brothers Azone, Ruffo and Giovanni Niger da Viustino, and gives the rights to use water from an excavation into Rivo San Savino. However, on page 83 of her article Cademartiri provides a table of all the mills associated with the San Savino monastery. The first listed is for June 6, 890,

The 12th century continued the development by the church institutions to the west and south of the city.

With an increase in population, there was a move in 12th century Piacenza to distribute water rationally for food production in the fields around the city. This went along with the process of land reclamation through wetland drainage. Water was the fuel of its day, as its power was used to run mills and presses in the countryside and inside the city⁷⁰. In 1170 and 1180, the city redeveloped the canals that ran from the Trebbia to the city. It engaged in new construction for the Rivo Comune, the main urban canal off of the Trebbia River. The construction involved upgrades to the infrastructure with work done at Colonna, the site of the division into the two main urban channels, Rivo Comune and Rivo Piccinino (see figure 2-11). The canals divided many times as they travelled through the countryside and entered the city so that when the water channels finally arrived at Piacenza they were incorporated into the new city walls through tunnels⁷¹. In 1197 there was further development of the water infrastructure. The city conceded rights for new canals to service churches, institutions and mills that increased the network of irrigation canals around the city⁷². Infrastructure improvements were not limited to canals and in 1160 the city built a toll bridge across the Po River but gave a long lease to the church. However consortia saw the profit in bridges and more were built to facilitate travel and income⁷³. The development of large scale infrastructure projects required the concurrent development of appropriate administrative structures that could mediate water and other

located near the church of San Savino, which would indicate that a canal could have been constructed by the 9th century. Though she does not indicate if any of the mills were animal powered rather than water powered. Alternatively she also lists a mill in a canal near the gate of Porta Nuova, the same area, for the year 1050. See pp.78-83.

⁷⁰ The presses were often used for grapes and to grind the dyes used in textile production. Mills were important for grain and paper production. Tanners used ground tree bark from the mills to process skins.

⁷¹ Eds. Fausto Aosta, Piero Castignoli, Claudio Vela, Trebbia, immagini della cartografia storia, (Piacenza: Archivio di Stato di Piacenza, Amministrazione provinciale di Piacenza, Tip.Lo.Co.) 8, intro by Piero Castignoli.

⁷² Cadematiri, "Lo sfruttamento delle acque," 72-93.

⁷³ De Paulis, "Plaisance et les voies fluviales," 57. De Paulis does not explain the type of bridge that was constructed but due to the width and fluctuations of the Po River, it was likely a pontoon bridge of linked boats.

rights. It also necessitated consortia and private partnerships to fund construction and maintain the infrastructure.

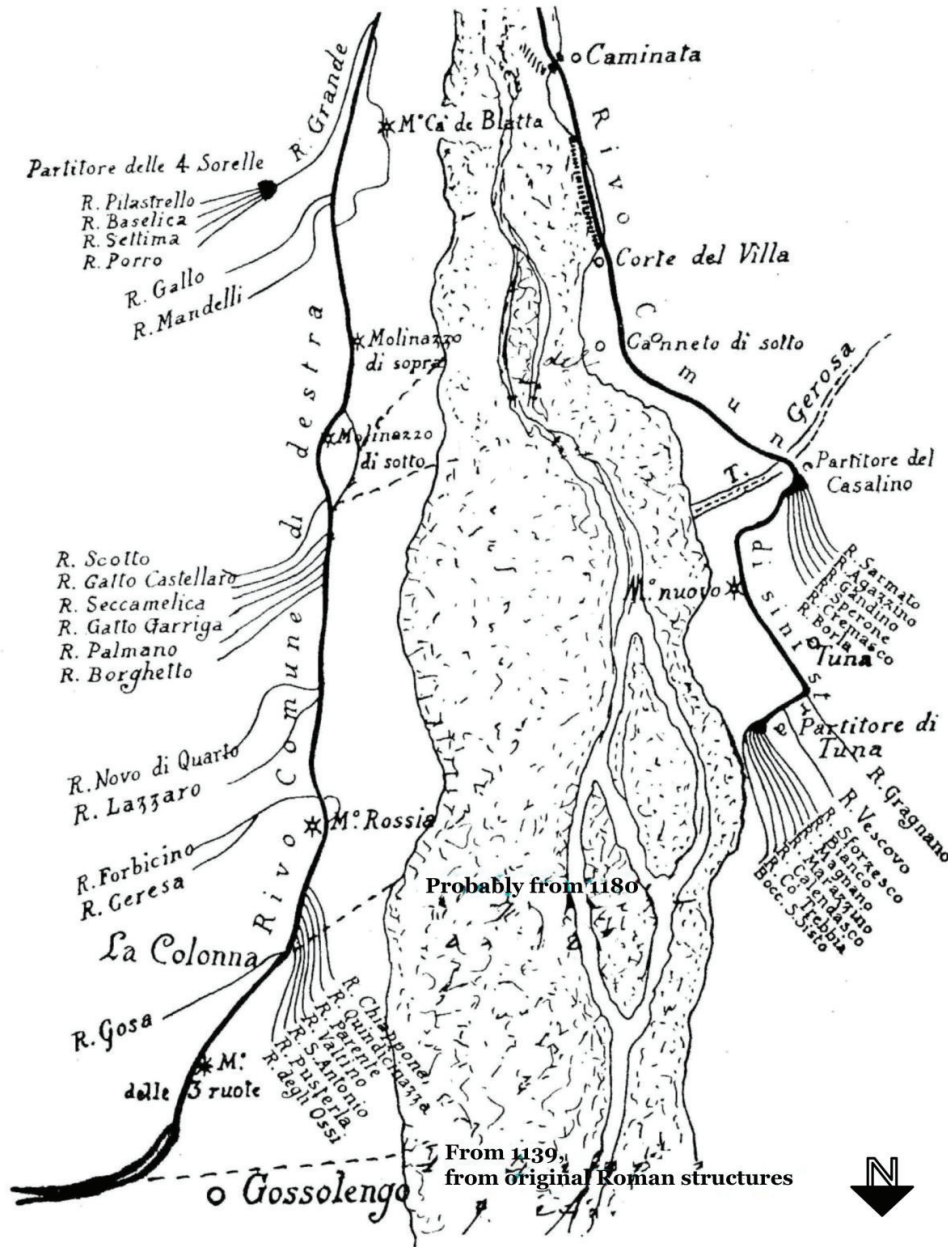


Figure 2-12: Trebbia River and canals from Middle Ages that shows the irrigation canals and the start of the urban canal system at Colonna. From Maria Cademartiri, “Lo sfruttamento delle acque nel piacentino tra XII e XIII secolo: l’ esempio delle proprietà del monastero di S. Savino.” *Bollettino Storico Piacentino* 82.1 (1987) 90. She attributes it to Gustavo Della Cella, “La condotta piacentina” cit., in *L’agricoltura piacentina*, IV, 1911.



Fig 2-13 Overview of the main canal system from Colonna to the city of Piacenza with overlay to emphasize canal lines and Farnese walls. Taken from Maria Cademartiri, “Lo sfruttamento delle acque nel piacentino tra XII e XIII secolo: l’ esempio delle proprietà del monastero di S. Savino.” *Bollettino Storico Piacentino* 82.1 (1987): 87. She attributes it to Gustavo Della Cella, “La condotta piacentina” cit., in *L’agricoltura piacentina*, IV, 1911.

The rise of the church had filled the city with church buildings and monasteries, however, the city sought to establish itself as the new power. The urban administration wanted to be particularly representative of commercial interests, and tended to sort out rights to civic space and infrastructure to its own advantage. With the demise of the old Roman centre, the city lacked a unifying space, though new centres had emerged due to the rising commercial interests in the city. A new piazza in front of the rebuilt cathedral

replaced the piazza in front of the earlier basilica, San Antonino, as the city focal point in 1179. It became the hub of political life as well as the site for a market. The other point of spatial power was a piazza at the heart of the Borgo, a post-Roman neighbourhood at the northwest edge of the city. The piazza at the centre of this neighbourhood was near several important churches as well as a significant concentration of commercial activity due to the close proximity of the important Beverora canal and its offshoots. As the feudal factions increased their presence within the urban space, towers were built for defensive purposes. Piccinini claims that towers especially dominated the piazza in the Borgo with 14 towers total in the city⁷⁴ Residents of the city were members of their parish neighbourhood as indicated by the name of the local church. Neighbourhood associations, generally church-connected, took care of their members from birth to death and had a role in stabilizing urban relations⁷⁵.

As the city grew and developed the countryside underwent a revitalization of feudal power. Chief among these families in Piacenza were the Landi. They achieved a position where they were subordinate only to the Emperors, who affirmed the Landi position and rights. The establishment of strong feudal territories by the 13th century raised the issue of control of the city space itself, as the city was the centre of commerce and the place of industrial production. Since the 12th century, the city administration had progressively taken control of the water infrastructure in the surrounding territory. It was vital to be in command of various infrastructure installations and the tolls and taxes deriving from their usage. It also guaranteed water to the urban industries that included mills, textile production, and tanning, another essential component to economic development. Cademartiri points out that all property owners in the region, whether lay or ecclesiastical, single owners or those who were members of an association, all wanted to monitor and have some control over the administration of water⁷⁶.

Valeria Poli describes the evolution of urban government and its authority over water. She points out that in the *Registrum Magnum*, the position of *extimator civitatis*

⁷⁴ Piccinini, *Il Palazzo Gotico*, 11.

⁷⁵ Racine, "Paesaggio," 235-236.

⁷⁶ Cademartiri, "Lo sfruttamento delle acque," 73.

oversaw the management of land and homes, and the water channels from the Trebbia and Nure. The first *magistri aquaram* (water judges) were named in 1285, Enrico Buragia and Marchisio Bigolo. The city also named official municipal engineers in the 13th century. A record from 1255 in the *Registrum Magnum* directed the *Podestà*, an outsider appointed by the city council to act as a non-partisan governor of the city and its territory, to utilize a technical expert in the resolution of a controversy about rights from Rivo Comune. Such judicial oversight of the water system survived and continued into the Visconti period⁷⁷.

The economic development of the city attracted new residents, many of them unskilled labourers. Up until then most housing had been single storey but the city expanded in population and according to Racine, two storey housing was begun to ease the strain, however some people had to settle outside of the walls. Racine examined house sales from the 13th century and found descriptions of buildings as homes with gardens, courtyards, solarium, and those constructed partially of brick and wood in diverse neighbourhoods⁷⁸. Racine describes a neighbourhood of fishermen and those who handled the boats on the Po River that developed in the northern part of the city. A neighbourhood for those who dyed textiles appeared west of San Sepolcro where there was an abundance of canals. The metal workers settled near San Savino in the southeast part of the city. The Borgo, with its important church of San Brigida was the location of textile workshops and further out along the Strada Levata were shops, workshops, and hostels⁷⁹.

⁷⁷ Valeria Poli, Architetti, ingegneri, periti agrimensori, le professioni tecniche a Piacenza tra XIII e XIX secolo, (Piacenza: Banca di Piacenza, 2002) 22-3. On page 22 Poli gives some of the early terms used to describe the profession of water manager include *magistri aquarum* or water magistrate (1285) and *ingegneri del Comune* or city engineer (1281), and *agrimensore del Comune* or city surveyor (1355).

⁷⁸ Pierre Racine, Plaisance du Xème à la fin du XIIIème siècle: essai d'histoire urbaine, tome 2. (Lille: Atelier Reproduction des thèses Université di Lille III, Paris: diffusion H. Champion, 1980) 442-444.

⁷⁹ Racine, "Il paesaggio urbano," 227-241.

The convent of San Sisto continued to dispute water rights especially for fishing, along part of the Trebbia, the Po River and the Fodesta canal⁸⁰. The other large religious foundation, San Savino, also continued its disputes about water management. During the 12th and 13th centuries, there were several jurisdiction disagreements, which sometimes ended in compromises between San Savino, the city, and other city churches. Control over water that ran through the countryside around the city gave the monastery enormous power; because in addition to basic canals, it had rights to fishing and mills. By holding such critical water rights, the monasteries and churches of Piacenza were able to retain a certain amount of control, even as the political authority of the city shifted to the *Comune*⁸¹.

The urban administration, when in power over the nearby countryside, sold concessions to small groups of rural landowners to excavate and manage canals for irrigation of agricultural lands⁸². Irrigation rights were very specific and might be for a particular canal or *rivo*, a ditch which branched from a canal, or for the freedom to draw water from a canal for certain days and times of the week. Rights also had to be acquired to run canals over intervening fields that came between the main water source and the final destination of the infrastructure. Eventually, each channel in the agricultural production area had its own collective responsible for its management. These associations were often made up of those who owned the land along the channel, together with feudal lords and churches. Whoever acquired the rights to draw from the main body of water was responsible for development and maintenance of the utility. This patchwork of private enterprise associations, under city management, was transferred to the urban area itself, with many *consorti* created to construct and maintain the water system. Feudal lords, who wanted to draw an income from their water assets, also learned to invest both in the urban administration and in the infrastructure of the countryside. Those who

⁸⁰ Zaninoni, "Ponti, Guadi, Porti," 264, 265, 269.

⁸¹ Cademartiri, "Lo sfruttamento delle acque," 72-93.

⁸² *Il Registrum Magnum*, in the introduction Racine notes that the city sought to maximise its profit through the sale of water rights to land owners in the surrounding countryside.

increased their use of water power with investments in the required infrastructure for mills saw their fortunes increase⁸³.

By 1300 Piacenza was the second city of the Emilia region, following Bologna. It was densely populated with 23,000 residents, with more in the nearby countryside⁸⁴. With its advantageous location, it prospered as a city with a strong artisanal population, which led the area in the production of woollen textiles along with cotton and linen fabrics. Bosker et al. researched the number of foreign trade connections for European cities. They found that Piacenza was one of the top ten cities at that time in terms of foreign urban potential, that is, in terms of trade connections outside of the Italian peninsula⁸⁵. Over time the city government came to be ruled by the heads of the feudal families, divided into various factions. Yet the countryside, the land base of those feudal families, was difficult for the city to control, especially with regard to what remained of the wetlands and uncultivated areas. While the feudal families established their power in the city, the monastery at Bobbio, up in the hills at the head of the Trebbia Valley, ruled much of the adjacent district and commanded 3,000 square kilometers of land⁸⁶.

In the mid-13th century, the *Ghibelline* cause lost in Piacenza to the power of the church and the *Guelfi* party. As part of the settlement, the city required that Ubertino Lando build a Franciscan church. The church was begun in 1276, and it set the stage for a new city centre just west of the old Roman area. For a time, the open space around the church was used for religious events and preaching. Then in 1281, Alberto Scotto of the Scotti family, a *Guelfo* by affiliation, chose that area for the new seat of city government. Alberto Scotto was the most powerful man in Piacenza. He was the leader of the bankers and merchants and active in city government. He began as a merchant and was then admitted to the nobility through marriage into the Da Fontana family. Scotto chose the

⁸³ Storia di Piacenza, 104-5.

⁸⁴ Bosker et al. The Development of Cities in Italy 1300-1861, CESifo Working Paper #1893, Category 10: Empirical and theoretical methods. < www.CESifo-group.de>, 2007, p. 37.

⁸⁵ Ibid., 37. Piacenza remained in the top ten until 1800.

⁸⁶ Giorgio Chittolini, "Profilo della storia di Piacenza tra il Trecento e il Quattrocento" *Il Gotico a Piacenza, maestri e botteghe tra Emilia e Lombardia*, eds. P. Lavagetto and A. Gigli, (Milan: Comune di Piacenza, Skira editore, 1998), 17-18.

site because it was equidistant between the two existing important squares, that of the cathedral and that of the Borgo. This led to the demolition of the existing church of San Bartolomeo and of the private church Santa Maria de Bigulis. Then the communal hall, the *Palazzo del Capitano della Società dei Mercanti e dei Paratici*, soon called the Palazzo Pubblico or the Gotico, due to its architectural style, was erected. It became the residence of the city administrator, the *Podestà*. The plaza to the southeast of the building became the site of important city events⁸⁷. This meant that the centre of the city had permanently moved away from the old Roman centre and that the *Comune* government had become an autonomous power.

The new city building occupied the high point in the landscape in what is a fairly flat city site. Ultimately, it would serve several purposes, including that of a jail. The actual plaza is not well-defined and spreads out and over what are considered several smaller plazas. There is evidence of a well available for clean water to those who lived and worked at Palazzo Pubblico.



Figure 2-14: the Palazzo Pubblico or the Gotico.

⁸⁷ Marcella Spigaroli, “La via Francigena nel territorio Piacentino: percorsi e centri di pianura.” *Piacenza e i pellegrini lungo la via Francigena*. ed. P. Racine. (Piacenza: Fondazione di Piacenza e Vigevano, Tip.Le.Co,1999), 128.



Figure 2-15: Portico of the Gotico.



Figure 2-16: Well in the cantina of the Gotico. Giorgio Eremo, La Piazza “Grande” di Piacenza o de’ Cavalli, (Piacenza: Editoriale Liberta, 2005), 82.



Figure 2-17: Piazza Cavalli (originally Piazza Grande) looking east to the church of San Francesco. The pink building at left was once a tower used by the Visconti for incarceration as this area was part of the fortified city centre during the Visconti era. Photo taken on June 14, 2011 by leochiodojans from <http://www.panoramio.com/photo/54247724>, accessed 10 February 2013.

The new communal centre sat within a city that was divided into quarters, or *squadre*, which spatially embedded the factions who struggled for political and economic control. Though constructed by Scotto, a member of the *Guelfi*, the Piazza Grande acted as the fulcrum of the four urban sections. Each quarter had a major, faction-supported, church as an important gathering place. For the da Fontana it was the convent church Santa Eufemia (est. 1000), for the Landi family the important church was Santa Maria del Cario (later Santa Apollonia, est. 938), and the Scotti family became closely connected with the Dominican monastery of San Giovanni in Canale who acquired their site in 1308⁸⁸. It is unclear which church served the fourth family, the Anguissola.

⁸⁸ Giorgio Fiori, Il centro storico di Piacenza. Palazzi, case, monumenti civili e religiosi, Tomo 3, (Piacenza: TEP, 2005-2008), 95.

1313: the Visconti

Italian cities with their own governments experienced continued factional intra-urban conflict as various feudal families vied for primacy over the city. This was also a time of interurban warfare, as cities sought to rule their territories and extend their spatial control, which left the Italian peninsula unsettled and unstable. Out of this struggle for power arose the Visconti family, who gained control of Milan and much of northern Italy. On 13 September 1313, Galeazzo Visconti of Milan was welcomed into Piacenza and declared ‘perpetual Lord’. He and his descendents set about the task of remaking the city, politically and spatially. The arrival of the Visconti meant the end of Alberto Scotto’s rule as he was both a challenge to their authority and a *Guelfo*, a supporter of the Pope.

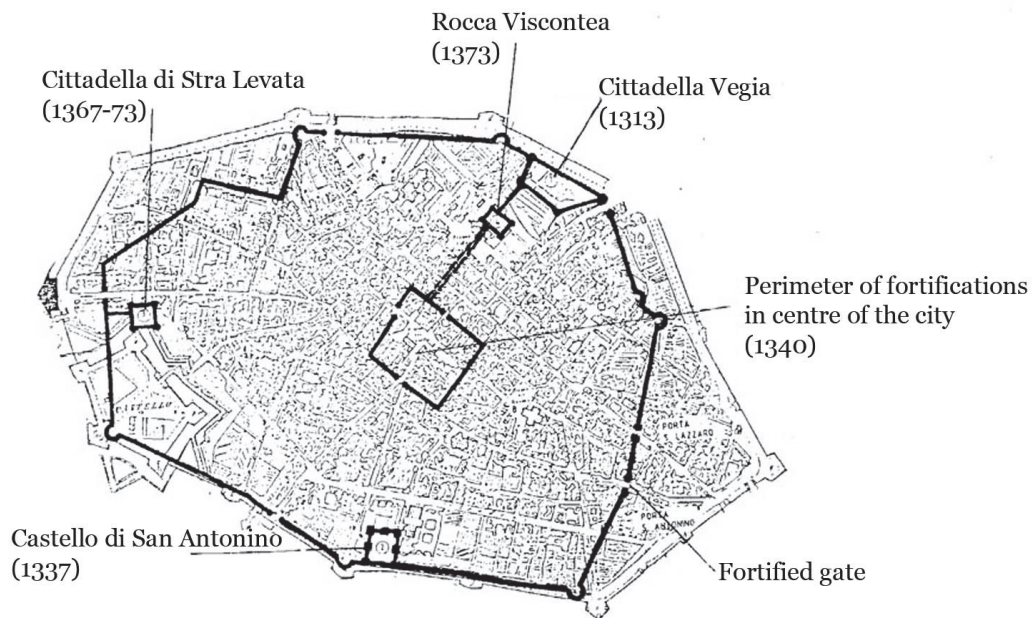
In 1320, Azzone Visconti began to fortify the city centre at Piazza Grande, and Luchino Visconti completed the encirclement in 1340. This interrupted construction on the Palazzo Pubblico. Azzone Visconti was the first to institutionalize the political factions in 1336 with his reorganization and reform of urban government. Cities with communal governments had developed elaborate election procedures, sometimes including a leadership rotation, to cope with the infighting and factionalization of the administration. Visconti divided the city between the Scotti (*Guelfi*) and the *Ghibelline* parties with a third party, the Bardelli (*Guelfi*) to balance power⁸⁹. In 1337, Azzone built Castello di San Antonino in the south end of the city. In continued reorganization in 1355, Galeazzo II created a new committee in charge of water and roads and established an official position that oversaw the judiciary for water, roads and bridges⁹⁰. In 1368, another castello was built along Strada Levata, on the west side of the city. In 1378, yet another fortification was added to the north end of the city, Rocca Viscontea. According to Poli the Visconti focused on the north end of the city because the road to Milan was located there, along with the main fair, the Fodesta canal, the Fodesta cittadella (1322, 1389), and the Po River⁹¹. In 1385, the Visconti ruler reduced the number of city council members, and redefined the city with 5 rather than 4 squadre. Squadre could nominate

⁸⁹ Bellosta, “Le squadre,” 32.

⁹⁰ Poli, *Architetti, Ingegneri*, 74.

⁹¹ Poli, “Il sistema delle acque nella storia,” 335.

members for the city council in accordance with party affiliation and family allegiance. They could also nominate people for city clerk, accountant, auctioneer, courier, and deputy of the salt tax. The offices of city advocate and fiscal lawyer included one member from each party in order to maintain a balance of power⁹². Overall it appears that the Visconti rulers maintained a system of oversight for water infrastructure similar to what had come before. The system seemed to work somewhat independently of the urban factions and there is no information on how infrastructure maintenance or extensions were affected by the factional politics of the time.



Plan of Piacenza under Visconti rule. Dark line is the city walls of the time. The base plan is the later Farnese centre.

Figure 2-18: Visconti fortifications from Spigaroli, M. “La via Francigena nel territorio Piacentino: percorsi e centri di pianura.” *Piacenza e i pellegrini lungo la via Francigena*. ed. P. Racine. Piacenza: Fondazione di Piacenza e Vigevano, Tip.Le.Co, 1999, 159.

⁹² Bellosta, “Le’squadre,” 35.

The new ducal rulers of the 14th and 15th centuries were a challenge to the urban factions and their feudal leaders⁹³. First the Visconti, and then the Sforza successors, from Milan imposed reforms from time to time to deal with the continued violence, conflict, and factionalism in city politics and social life⁹⁴. However, in 1420, under the Milanese rulers, the city handed over control of the water ways and canals that ran from the Trebbia River to the city to Count Landi at Rivalta, a strong feudal territory on the Trebbia River associated with the imperial cause and therefore the Visconti cause. This led to 50 years of complaints due to insufficient water supply to the city, irregular flow amounts, and water theft. It was not good for mills and industries to be left high and dry due to mismanagement or even malicious management of the city water. Mills and presses that lay idle also meant a loss of tax revenue for the city. In 1470 a city-initiated reform was the first step in the reorganization of water management, a process that would continue under the Farnese dukes in the 16th century⁹⁵. These events will be explored in more detail later in the chapter.

1498: a part of the Papal States

The ruling Sforza family and Milan and its territories fell to the French in 1498. This created a period of instability with shifting political alliances. Later during this time Piacenza came under new leadership as a part of the Papal States which created tensions at the international level. Charles V, the Emperor who controlled most of Italy by 1530, then held the duchy of Milan to the north. Piacenza and Parma, the cities and their territories, were on the border of his lands. But they were also close to Bologna and points south, which were already part of the Papal States. The tensions escalated when Cardinal Alessandro Farnese became Pope Paul III in 1534. Piacenza and Parma became part of a political contest between the Pope and Charles V as they struggled for power and control. From 1500 to 1513 Piacenza had a municipal government with a Milanese or

⁹³ *Ibid.*, 32-35. Bellosta uses a variety of city records including *Statuta vetera et antique*, and the *Provviszioni e Riformagioni del Consiglio generale e dell'Anzionato*.

⁹⁴ The Sforza followed in the succession of the Visconti family in ruling Milan and its territories. Francesco Sforza declared himself the successor through his wife in 1450.

⁹⁵ Valeria Poli, Le acque di Trebbia tra città e contado: norme, magistrature e uomini, dal 1420 al 1806, (Piacenza: Banca di Piacenza, 1995), 26-34.

imperial governor. After 1513, this governor was replaced by a series of papal officials as the Pope took advantage of both imperial and church weakness to increase the territories under his control. This created a rift with the rural feudal nobles who maintained their relationship with the emperor⁹⁶.

One of the papal legates, Cardinal Gambara, sought to expand and modernize Piacenza with the addition of two new roads, Strada Gambara (today Stradone Farnese) and Via Benedette (see figure 2-25). He stipulated that the new Strada Gambara would be financed by all who were currently citizens and churches located in the area. He wanted property sales along the new road to be made in ways that were favourable to the buyers but then the buyers and landlords had a responsibility to build residences within five years, with a financial penalty for noncompliance. He wished for grand houses built along the street as soon as possible. The decree also required that those who made use of the easily accessible canal water to drive a mill and who created a channel for the water across the new road had to construct a permanent bridge of good materials within 6 months⁹⁷. In this way, Gambara addressed both water and road infrastructure of the new urban development. Poli points out the establishment of a *tagliata* (a clearance), a circuit deprived of trees and houses of 500 *trabucchi* or about 1.5 km created around the city walls for a field of fire between 1525 and 1545⁹⁸.

1545: THE BEGINNING OF THE FARNESE PERIOD⁹⁹

The Farnese had risen from being obscure land owners located in small villages in Lazio and Umbria through the 15th century, to holding a place in the Borgia Papal court. The family achieved prominence through strategic marriages and employment as military commanders for the Popes. Alessandro Farnese, the future Pope Paul III, became a cardinal and rose rapidly under Pope Leo X. He gained in wealth and influence and had four children who were legitimized. Helge Gamrath notes that in a 1526 census in Rome,

⁹⁶ Helge Gamrath, *Farnese: Pomp, Power and Politics in Renaissance Italy*, (Rome: L'Erma di Bretschneider, 2007), chapter 6.

⁹⁷ Bruno Adorni, *L'architettura Farnesiana a Piacenza 1545- 1600*, (Parma:Luigi Battei, 1982), 32.

⁹⁸ Poli, "Il sistema delle acque," 337.

⁹⁹ See family genealogy and details in *Appendix E*.

the Farnese court had 306 persons and was the largest in the city amongst the cardinals¹⁰⁰. In 1545 Pope Paul III granted the duchies of Parma and Piacenza to his son Pier Luigi who began the line of Farnese dukes.

The decision to grant the duchies was contentious as the Emperor Charles V wanted Piacenza removed from the Papal States and to fall under imperial authority. The Pope prevailed and Pier Luigi gained the duchies only to be assassinated by local nobles in 1547. The new Farnese duke arrived in Piacenza with the intent that it would be his capital court city. However, while the citizens of the city may have welcomed him the feudal lords with rural bases were not so pleased. Hostilities increased with the construction of the new *castello*, a modern citadel and defensive fortification that effectively cut off the proposed Strada Gambarara. Charles V remained opposed to the first duke's ownership of Piacenza and Parma and continued to refer to him by the lesser title of Duke of Castro. Pier Luigi did not have power over the nobles who were aligned with the emperor. Soldini contends that it was clear that Pier Luigi intended to rule absolutely. The new duke set out immediately to collect taxes through a new *estimo*, and in a bid to diminish their power required that the nobility build residences within the city. The duke rushed to erect the new *castello* with impressed labour and a large capital outlay. This created labour and material shortages in the city and province. A *tagliata* (clearing), or demolition along the inside and outside of the new defensive walls destroyed buildings and neighbourhoods in order to create a clear area for sightlines. On 14 May 1547 the new *castello* perimeter was traced around the existing monastery of San Benedetto. The stars were consulted and the astrological predictions for the new site were not favourable. By that time the tensions between the first Farnese duke and local nobles had escalated. On 10 September 1547 Pier Luigi was ambushed and assassinated by a group of young nobles and on 12 September imperial troops from Milan moved to take over the city¹⁰¹.

By that time the urban canals had evolved over centuries and the urban administrators had experience in the management of water for industrial power and some

¹⁰⁰ Gamrath. *Farnese; Pomp, Power and Politics*, chapter 4.

¹⁰¹ N. Soldini, "Strategie del dominio, La cittadella nuova di Piacenza (1545-1556)", *Bollettino Storico Piacentino*, #86, (1991): 11-69.

sanitation in the city. There was the yet unresolved issue with the Landi control of the urban water supply in the countryside. There was the need to better manage sanitation, which would result in a great number of requests to install sewage cisterns early in the Farnese reign. Strada Gambarà, even in shortened form was not yet complete, and there would be squabbles about water provision to convent gardens for years to come, along with complaints of poor street drainage.

The imperial governor, Ferrante Gonzaga, completed the new *castello* after the death of the first duke. Meanwhile, the duke's son, Ottavio remained in Parma and made efforts to regain the duchy of Piacenza. The city and territory were returned to the Farnese in October 1556 through the Treaty of Ghent and Ottavio's wife (the emperor's natural daughter) ceremonially entered the city in 1557, however, Spanish troops remained in the city quartered in the citadel until 1585. The duke then began work on the new Palazzo Farnese in 1558. The Farnese directed their efforts to the stability of their rule through alliance with the Spanish, centralization in governance, and an increase in their lands and power with actions against local feudal families.

2.1.2 The Administration of the City of Piacenza and its Water

This section is taken from Sergio di Noto's work on the government structure for Parma and Piacenza under Farnese rule. Di Noto used two reports that were written for the Austrian government after 1736 when they had taken over the duchies. The reports reflect back and illuminate the structure of government under the Farnese dukes as a base point for Austrian modifications¹⁰². The Farnese rule began as a transition away from the feudal structures of the Middle Ages when the government had to account for the power of the feudal families and their ancient rights. At the same time, one of the goals of the Farnese dukes was to reduce the power of those very same families. This meant the government structure was a kind of hybrid with some holdover from earlier times while anticipating the more rationalized governance of the Austrians. The Farnese dukes also

¹⁰² The Austrians were in the duchy for 12 years, beginning in 1736, as a part of the settlement in the War of Polish Succession. After that the duchy was returned to the Bourbon family (related to the Farnese) in 1748 and Duke Philip established the house of Bourbon-Parma.

had to contend with the issue of two dominant cities, Parma and Piacenza. When the Farnese reign began, Piacenza was the stronger city economically and with its site on the Po River had easy access to the main trade routes. However, the assassination of the first duke followed by the takeover by imperial forces compelled the Farnese to relocate their court to Parma, which then prospered. But the Farnese government was never truly centralized, and each city had a similar governance structure which resulted in a duplication of offices¹⁰³.

The most important person in Piacenza was the governor (*Governatore*), the man who was chosen by the duke to represent his interests to the city and territory. The governor was backed by the duke in his decisions and was the voice of the duke to the residents of the duchy. He oversaw civil and criminal justice, taxation, the various urban committees, the city council, the market and regulations on various goods, and the governance of the countryside. Like the ancient *Podestà* position he was not from Piacenza and hence was supposed to be neutral, especially in relation to the feudal families with their ancient divisions¹⁰⁴.

Under the governor was the city council, which retained a structure similar to that of previous years. It had been reformed in 1530 by the Cardinal Salvati but this was not a large shift in how it had functioned. The structure of the council had to take into account the existence of the four major families, the Landi, Scotti, Anguissola, and Fontana, and then the existence of the different classes or orders of residents. In the Farnese incarnation of the council the classes were the *Magnifici* (*Marchese, Conti, Cavaglieri d'ordine and Dottore del Collegio de Signori Giudici*) the *Nobili* (those with noble origins or created by the duke or council) and the *Popolari* (merchants and well-off citizens). Generally, each of the four families put forth representatives from each class. This was the end result of reforms throughout the Visconti and Sforza eras and from the Cardinal Legate in 1530 where each reform had normally tweaked the number of major families and representatives within each class or order. Through various electoral and selection mechanisms the council provided counsellors to the governor and members for

¹⁰³ Sergio Di Noto, Le istituzioni dei Ducati Parmensi nella prima metà del Settecento, (Parma: Comune di Parma – Grafiche STEP 1980), 1-28.

¹⁰⁴ Ibid., 78.

committees¹⁰⁵. The duke also employed a number of officials to perform state duties that included charge over fiscal matters and taxation, magistrates for criminal and civil matters, and the water commissioners.

In the 1585 reform duke Ottavio affirmed the two paid positions with oversight of the whole water system from the Trebbia. The office of *Referendario* had been in place since 1391 and was essential in the dry season as he oversaw the division of water at Colonna and into the city. The office of *Commessario* also predated the Farnese era and went back to the Peace of Constance (1183) with the mandate to oversee imperial water concessions. Over time the position evolved to have charge over the Trebbia irrigation canals above Colonna¹⁰⁶.

The gravity-fed canals required constant maintenance to reduce or counter silt build up due to the rubbish and sewage that entered into the channels. This demanded a well-organized city administration to ensure the water flowed without back-ups through the urban space to supply mills all the way to the north where the water exited to the Po River. It is this constant need for maintenance and repair that would occupy the time of the committee of urban administrators in the years to come. In charge of the urban water system was the *Congregazione sopra la Polizia* (also known as *Congregazione sopra l'ornato*). Created by the first duke on 17 June 1546, this group was made up of representatives of each of the main families, the *Referendario*, and varied others, under the oversight of the governor. This committee was responsible for roads, canals, and waterways. They had access to some funding though they also had the power to collect taxes, generally from those inhabitants closest to the infrastructure in question. They had charge over business licenses and did employ deputies and professional experts. Di Noto also lists a *Congregazione sopra le acque* although this committee appears to have had jurisdiction over the canals in the countryside and was not included in this study¹⁰⁷.

Water was historically organized through municipal statutes and agreements. The medieval statutes, translated and printed in 1899, focus on water regulation through the

¹⁰⁵ *Ibid.*, 387-399.

¹⁰⁶ *Ibid.*, 315-316.

¹⁰⁷ *Ibid.*, 371-3.

quindicena system, the creation, management and repair of infrastructure, and the penalties for non-compliance. The statutes begin with the assertion that irrigation water within a half mile of the city is free to be used on gardens and orchards. However, illegal activities at night were penalized at double the normal rate. There was also a right of use established for an individual who had utilized a channel for irrigation for the past 20 years so they could then continue with it. Rights of ownership were established for those who owned the property over which irrigation channels ran and the ownership of the infrastructure for those channels. If someone along a channel did not contribute to the cost of the infrastructure, they could not legally use it. The *Podestà* and judges are mentioned as the final arbiters of the system, who decided how water was divided and used, and dealt with appeals. The millers were enjoined to purge the urban canals at least once a year, and given time limits in which to dispose of the materials removed from the canals. Any new infrastructure that created a cut across the road had a time limit in which to build a stone bridge or to repair the roadway with timber. Special mention was made of the abattoir located near Santa Brigida and the Borgo. And overall the city gave itself the right to sell water and to set prices¹⁰⁸.

Water rights were negotiated and articulated again in 1470 when the city found itself in dispute with Count Manfredo Landi over the management of the locks at the Trebbia River. These new statutes demonstrated a concern for the rights of the nobility who by that time had gained control over the system. Adopted on 15 October 1470, the new agreement stipulated the state of the infrastructure and mandated that the water was to be kept flowing to the urban mills, that urban garden plots remained irrigated and that the health of the residents be upheld. The office of a water judge and a city engineer were mentioned along with deputies employed by Count Landi though there was no mention of the millers. However, the end of March was designated as the time when the canals were

¹⁰⁸ From the ASPc: Catalog #: 990 VII 6(47): Statuta et decreta antique civitatis Placentias, Rubriche estratte dal Libro V, Riferentisi al Governo delle Acque, Ristampate tradotte per ordine del municipio MDCCCLXXXIX, Piacenza – tip edit giacomo Favari. For complete version in Italian see *Appendix B*.

to be cleaned. Overall, this document has a very different tone from the earlier statutes and reflects the struggle between the city and the nobles for control of water resources¹⁰⁹.

The 1585 ordinance, which was renewed in 1691, was focused on another relationship. This time Count Landi and other nobles were absent from the decree. Instead these ordinances were between the duke, as represented by the new Water Commissioner, and the city. The new agreement began with an acknowledgement of the untenable water management situation in the 16th century that had caused much inconvenience in the city. The duke then gave authority to a Commissioner who had ultimate authority over the entire Trebbia water system. It was the Commissioner who would determine how the Trebbia water was divided at Colonna. At the same time the city was given power, under the oversight of the Governor, to deal with water prices, fees and the tracks of timber required to be maintained along the river course¹¹⁰. It was acknowledged that the urban canals were to be privileged in terms of water provision. Rather than affirm water rights that had been exercised for the past 20 years the agreement required all those people with water rights to present them within 15 days of the ordinance going into effect so that they could be validated by those in charge¹¹¹.

¹⁰⁹ From the ASPc: Monograph 990 VII 6 (18): Capitoli per il regolamento delle Acque di Trebbia , anno 1470 (15 Ottobre), Stampati per ordine del municipio nell' anno 1900, Piacenza – tip Edit Giacomo Favari. Complete Italian version in *Appendix B*.

¹¹⁰ These timber tracks could either be to preserve the banks of the rivers and to prevent erosion, or they may simply have been a city-owned and managed energy source.

¹¹¹ From the ASPc: Monograph 990 VII6 (28): Ordini per il Reggimento delle Acque di Trebbia Stabiliti l'anno MDLXXXV, Ristampati nell'anno MDCLXXXI, Piacenza – per Gio Bazachi – Stampore Ducale e ristampati nuovamente nell'anno MDCCCLXXXIX in Piacenza per ordine del municipio, Tipografia Editrice Giacomo Favari. Complete Italian version in *Appendix B*.

The language of the statutes and agreements demonstrates the changing power structures associated with water management in Piacenza. The early statutes were simply focused on individual water rights. By the 15th century, with the rise of Landi control, the language shifted to reflect the troubled relationship between the city and the feudal noble families who owned many of the canals, especially with Count Landi, who had control of the urban water supply at its source. The last set of ordinances, decreed by the Farnese duke, established the relationship between the city and his representatives, the Commissioner and the Governor. Ultimately, it made the selection of the Commissioner important to the urban administrators in that they had to negotiate their actual power with him. And it put the real power over the system into the hands of the duke.

2.1.3 Piacenza: Urban Form and Growth

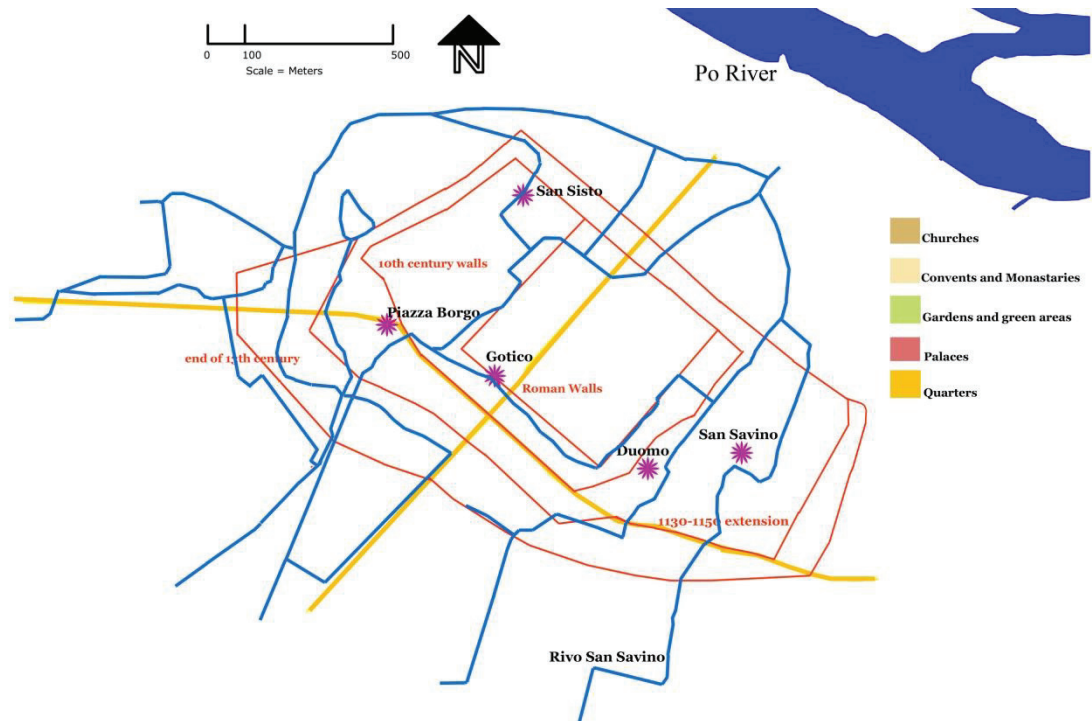


Fig 2-19: Wall extensions with city canals and quarters, and extensions, based on Pierre Racine.

Piacenza was laid out in conformity with other Roman colonies with two main roads that intersected in the city centre. Nevertheless Maria Pagliani notes a major modification to the normal Roman plan. Due to the location of the Po River at the preferred site, the city was oriented to the southeast and northwest, which caused the grid to be turned by about 45 degrees¹¹². This oriented the city along the ford across the Po River that connected with the road to Milan and points north. Pagliani claims this created problems in later centuries, when it came to the organization of both the urban street network and the territory, though she does not really clarify this statement. The first public spaces were the streets and the forum with its outbuildings. One main route, the *cardo*, as noted, continued across the Po north onto Milan. The other main route, the *decumanus* was later connected with the Via Emilia which led southeast to Bologna. Pagliani concludes that

¹¹² Pagliani, Piacenza, Forma e Urbanistica, 41.

the city was not oriented in accord with strict geometry but rather for political and strategic considerations¹¹³. She does not explain this statement; however, the city was located primarily to provide a line of defence against incursions from across the Po and to protect the road north to Pavia and Milan.

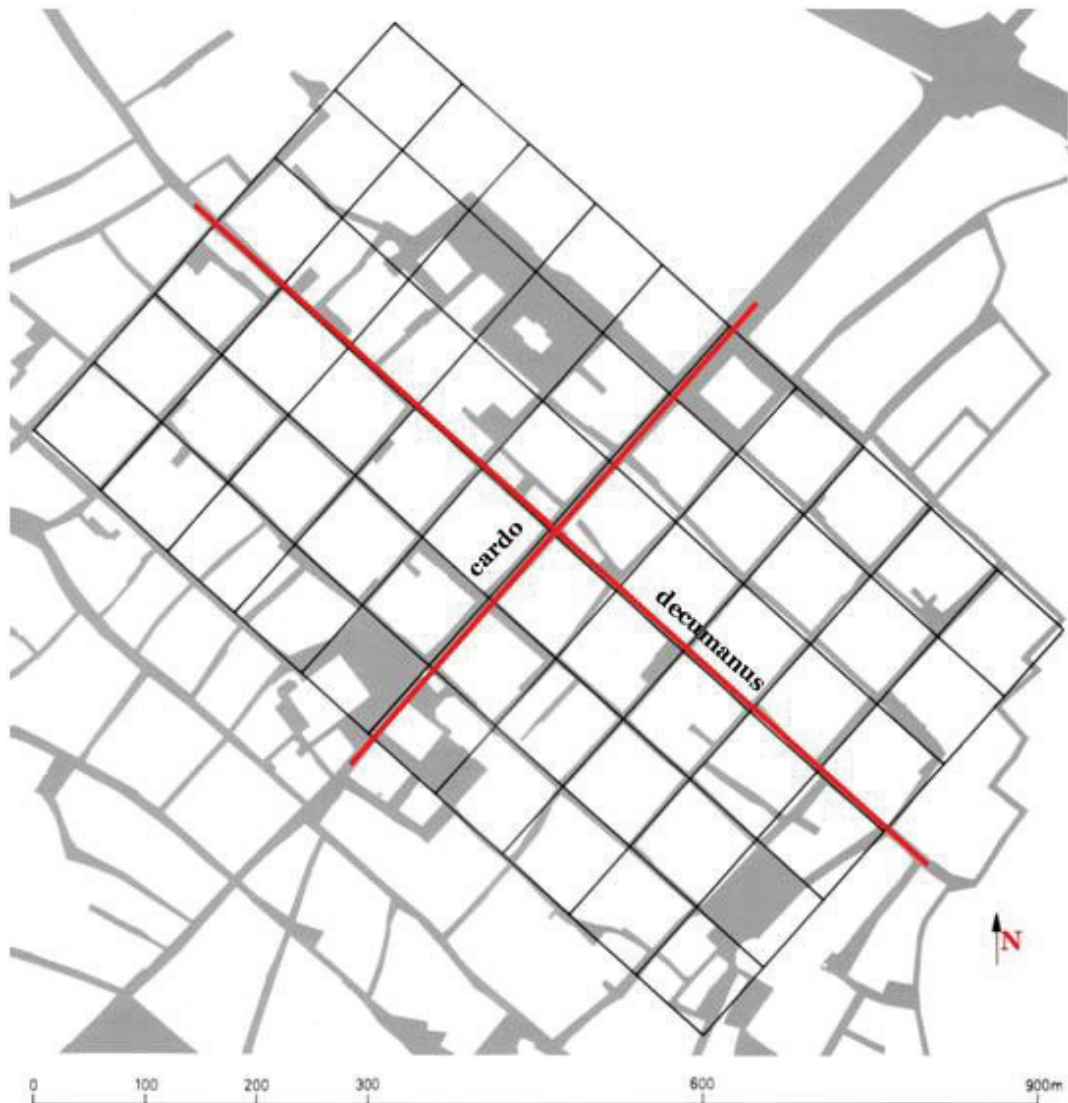


Figure 2-20: Map of Roman city with overlay of decumanus and cardo. Original by M. Pagliani. *Piacenza, Forma e Urbanistica, Città Antiche in Italia*, (Roma: L'erma di Bretschneider, 1991), 81. The city grid may have been shifted to accommodate the Po River and the location of a crossing there.

¹¹³ *Ibid.*, 42-43.

Pagliani describes the Roman city plan as rectilinear, ten blocks by six blocks. Some parts of the city today hold to the Roman layout. The blocks are somewhat irregular between 74 and 80 meters in length, but they were probably modified after the Roman era¹¹⁴. The territory outside the city walls was crisscrossed with minor roads, used by the army to manage the native populations, and by irrigation ditches from the Trebbia and Nure which enhanced agricultural production. The Roman settlers worked to drain the wetlands and convert the soil to agricultural production¹¹⁵.

One major project that served the city for a long time was the construction of the Fodesta canal just outside the Roman city walls (see figure 2-20). Pagliani states that the Fodesta ran from the mouth of the Trebbia through the city site and out into the Po, which implies that the mouth of the Trebbia has since moved west. This created a large loop, which channelled navigable water into the city¹¹⁶. The name comes from 'Fosse Augusta', and means *ditch, moat, or water channel* named after the Emperor Augustus. During the Roman and medieval periods this canal would have been just outside of the city walls but easily accessible by the population. Despite the obvious importance of this waterway to the city over its history, details on its location and construction are scarce.

Valeria Poli comments that the later network of urban canals tended to follow the lines laid down by the Romans except for two extensions to the north of the city. These extensions were based on the needs of ecclesiastical institutions founded under imperial authority that were once able to shape the city to their desires¹¹⁷. Paolo Squatriti supports the contention that the urban canals shaped the city, at least in part. He points out that

¹¹⁴ Modifications to the city in the 15th through 17th centuries make it difficult to determine the precise size of the Roman city. Archaeology has confirmed the location of some parts of the Roman walls. The forum was at the crossing of the *decumanus* and the *cardo*. Later, churches were erected there. Roman mosaic floors have been found in several locations. There is also some evidence of glass production as well as a cistern, drains, and sewers. For more see Pagliani, *Piacenza, Forma e Urbanistica*, 15 and 16.

¹¹⁵ Most of the rivers, including the Po, have shifted since that time; thus, it is often difficult to be precise on the location of Roman infrastructure projects.

¹¹⁶ Pagliani, *Piacenza, Forma e Urbanistica*, 78. Maps show the Fodesta canal to be just outside the city walls when built. Over time as the walls moved the canal came to be inside the city. Eventually it was cut off from direct connection to the Trebbia and simply became another urban canal.

¹¹⁷ Poli, "Il sistema acque nella storia," 333.

access to water made life easier for people, or even possible, and for that reason the layout of neighbourhoods and parts of the city could depend upon the location of the water supply, especially if it was provided by aqueducts or canals¹¹⁸.

The early Romans had founded the city with a total of 24 hectares within the walls of the original fortifications. This was extended during the Roman Empire to 36 hectares. After the invasions, under Lombard rule, the city inside the walls was enlarged to 45 hectares. Once the city government was organized in the early 12th century, wall building began and went on until the end of the 13th century with the enclosure of new neighbourhoods, gates, and new ditches. According to Racine by the end of the 12th century the city had six gates. By the end of the 13th century the walls would encompass 75 hectares or three times larger than its original footprint. However, the author of *Storia di Piacenza* asserts that the 1169 walls enclosed 86 hectares and that the walls at the end of the 13th century actually gave the city a secure space of 122.5 hectares¹¹⁹.

How decisions were made about medieval canal locations is impossible to discern. In only a few cases is it obvious. The San Savino canal came through the countryside, around the west and south edges of the pre-expansion walls to pass through the garden of its namesake convent. It then made a fairly direct run to empty into the Fodesta just before it exited the city. In a gravity-fed canal system, topography would seem to be the deciding factor. It is impossible to know how much influence existing waterway locations had on urban expansions and street development. The proliferation of bridges and underground pipes possibly indicates that in fact the location of even major canals had only a limited effect on how the city arranged itself as it expanded. The goal may simply have been to accommodate the required infrastructure within the new urban fabric in any way necessary. Once a canal ran through a part of the city, the rights to it had been sold. These rights could be either in terms of living along the edge of it, the use of it in artisanal processes, or the use of it to power a mill or press. Spatial rearrangement of the canals to suit urban expansion and rationalization may have been too costly to contemplate.

¹¹⁸ Squatriti, *Water and Society*, 18.

¹¹⁹ The lower figures come from Racine, *Plaisance*, 3-4. and “Il paesaggio urbano,” 227-241. Alternative figures from: *Storia di Piacenza*, 305.

In the late Middle Ages, the city extended its walls to the south and west several times as the Po River blocked extensions to the north. These extensions would have had to accommodate the existing canals as they entered the city. Each extension meant there was new land to develop for industry and housing. The extension would have taken in the existing convents and suburban residents, as they had pushed out from the city along the pilgrim routes and into the newer neighbourhoods. It would seem to have been the logical thing for the city to establish new roads along the system of waterways. This may be what happened in the case of the large waterway, the Beverora. But in other cases, the channels tended to run through gardens and backyards, sometimes underground, and only surfaced occasionally into public space. They tripped along through the city with a number of deviations and road crossings and finally connected up with the Fodesta to flow out of the city at the north gate. While the Beverora appeared to have a straight course for some distance as it approached the city, and then was incorporated into the urban fabric, others meandered like creeks through the urban space.

Between 1100 and 1400 there were 43 new parochial churches and ecclesiastical foundations established within the city. Whenever possible, the convents and monasteries chose the south and west edges of the city to accommodate their large physical facilities that included dormitories, refectories and cloisters, and to ensure a water supply to their gardens and mills¹²⁰. The church, in order to promote pilgrimages, pushed the development of the urban fabric beyond the existing city walls. Further out, new monasteries and convents were established along the major pilgrimage roads to provide services to the traveling population. It was normal for a monastic institution to have its own gardens to produce food for its residents. Many also had their own grain mills and presses. All of these facilities required water for irrigation and to power the mills. As the ecclesiastical foundations developed, so too did the water infrastructure for the city.

Many of the early maps of Piacenza show the city as a great blank inside its walls. The single delineated feature is the waterways, as they passed through the urban space from south and west to northeast. The canals set the locations of the urban industrial

¹²⁰ Siboni, Le Antiche Chiese Monasteri e Ospedali, the book contains a number of maps that detail the location of convents and churches since the establishment of Christianity in the city.

infrastructure, since water power was the source of energy to drive the mill wheels and presses. This infrastructure appears to have existed quite independently from the roads and avenues through the city as it was dependent upon the topography rather than any urban planning. There were connecting points, places where the two different infrastructures came together. Most frequently this occurred at a mill or factory reliant on both road access and water power, or it could happen when a channel surfaced out of the back gardens and crossed a city street, which could require a bridge. Canals ran along the edges of the major plazas in the city centre, in front of the cathedral and in the old Borgo neighbourhood. A city that is essentially level today must have had a number of bridges in town to facilitate pedestrians, carriages and transport of goods.

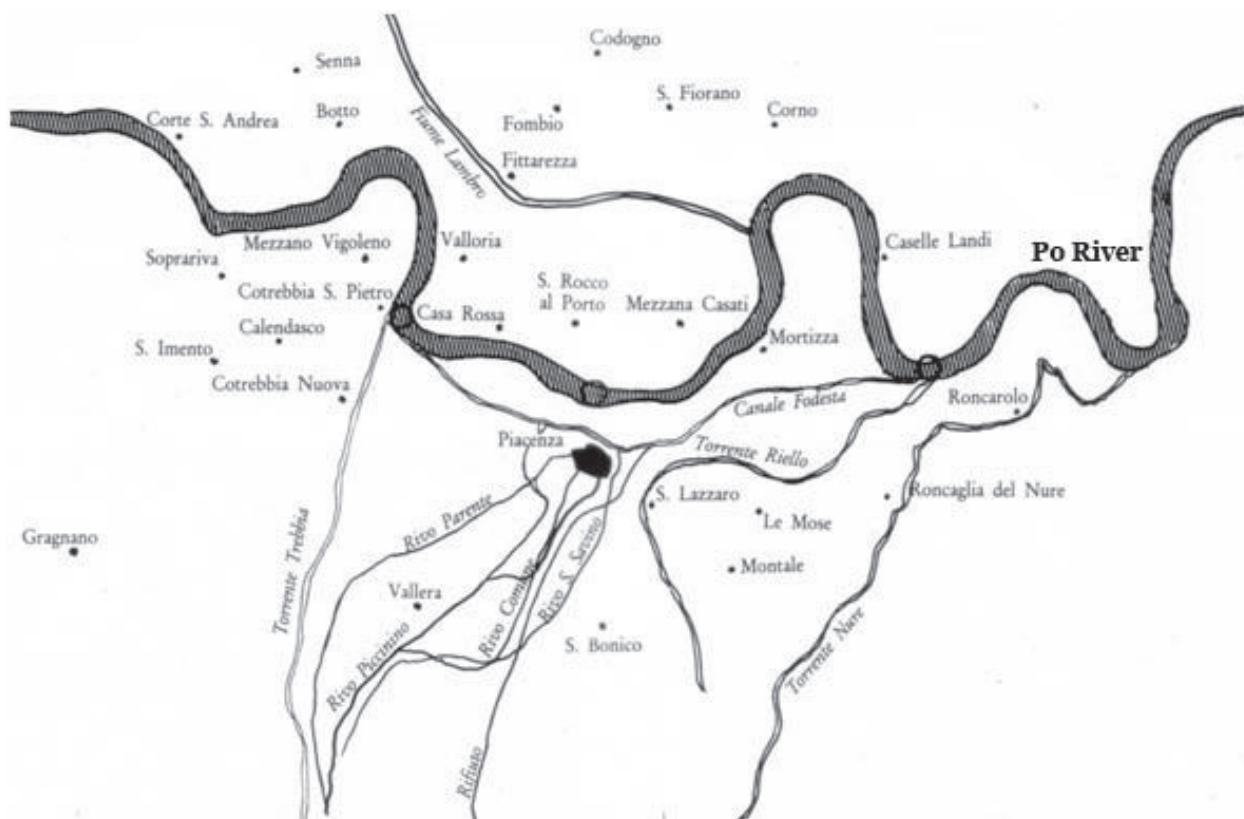


Figure 2-21: The medieval city with the Po River (hatched) Fodesta Canal, and canals from the Trebbia and Nure. From S Pronti, ed. Piacenza nella storia, dal origini al XX secolo, (Piacenza: Tip.Le.Co, 1990), 146.

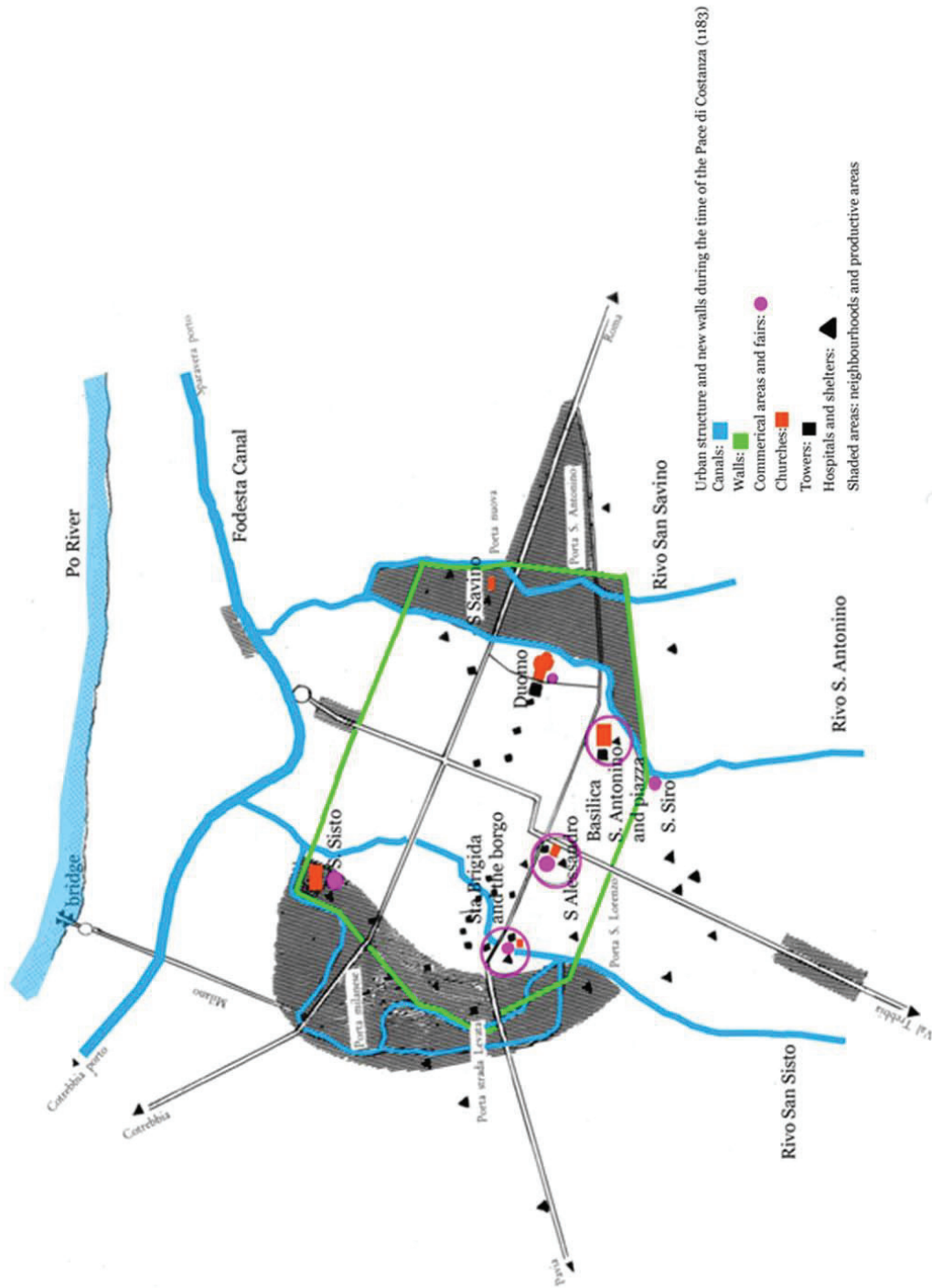


Figure 2-22: Medieval city with locations of canals, major churches, commercial areas, and medieval wall extension. From S Pronti, ed. Piacenza nella storia, dal origini al XX secolo, (Piacenza: Tip. Le. Co, 1990), 150.

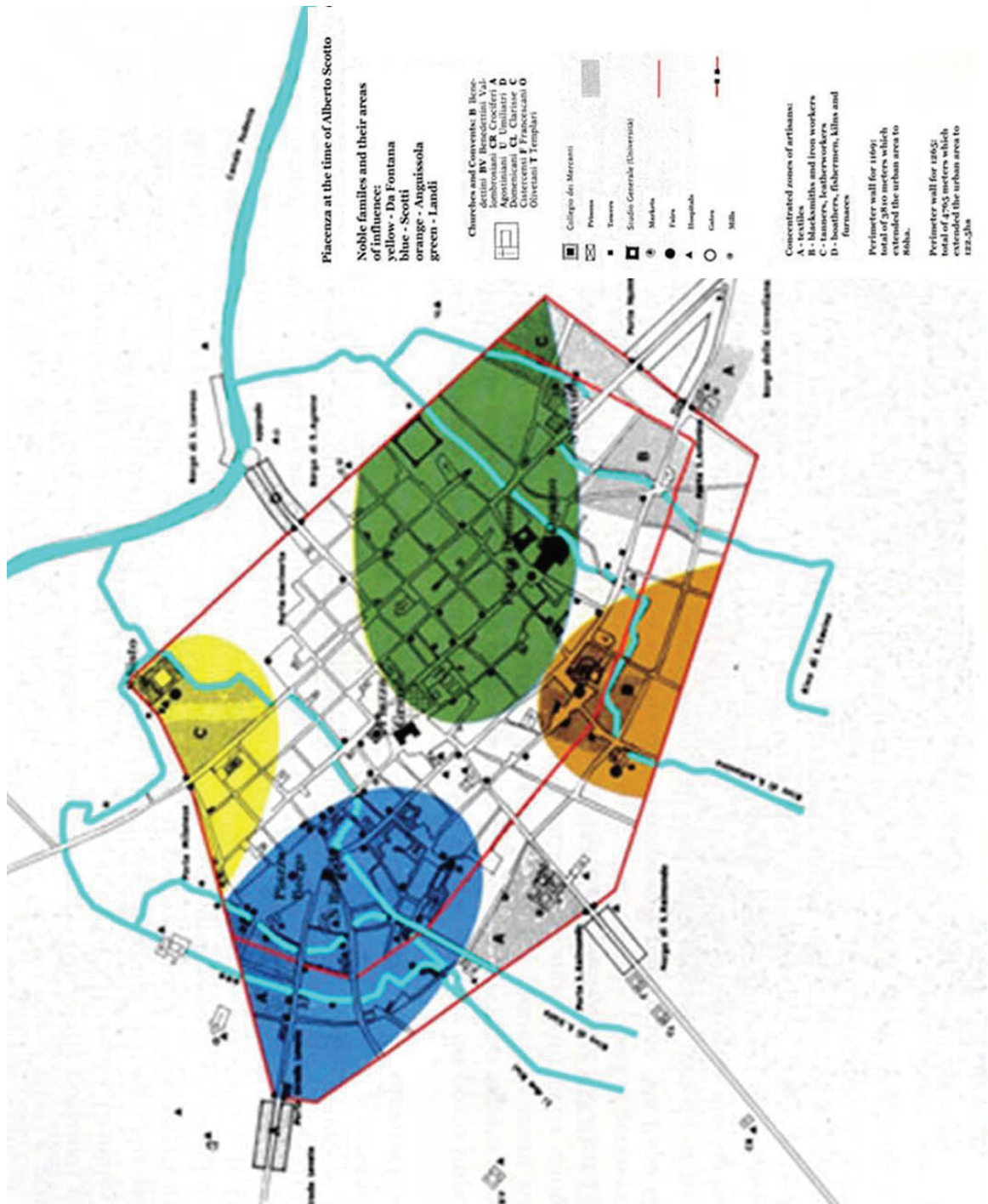


Fig 2-24: Enlargement of figure 2-22.

While the Roman blocks and urban design requirements determined the initial settlement of Piacenza, it is the canal system that shaped the urban space as it expanded. The waterways established where industry and artisans could locate though there are no records to indicate that polluting industries were sited downstream of the city. People settled the city in accordance with the location of industries either to take advantage of their position or to avoid them. Residents who had a choice built their homes and palaces near the water, so they could receive abundant and easy water service and water kitchen gardens. The location of the rich and poor, the sites of gardens, mills, industries and artisans all depended upon the canals.

In 1500 Piacenza had a population of around 25,000¹²¹. There was a push to expand the city perimeter. Cardinal Legate Brescian Uberto Gambarà, in office from 4 April 1542 to 24 April 1544¹²², wanted to rationalize and extend the medieval city according to the new urban planning principles. To do so, he created Strada Gambarà along the southern edge of the urban space. Adorni dates the new road to 18 October 1543 and it was to run in a straight line west to Porta San Antonio. It was to be a wider road, like a grand boulevard, so that the nobles could enjoy the use of their carriages on it¹²³.

Cardinal Gambarà's actions were in line with Renaissance urbanism and the drive to reorganize city space. As noted by Edmund Bacon, from 1470 to 1560 there was a progression of ideas about the city that resulted in the ideal city of the Baroque. Over that time the impetus to plan the space of the city progressed and by the beginning of the 17th century the ideas had evolved so that space and the buildings around and in the space became more connected as part of an overall design¹²⁴.

Spiro Kostof connects the rise of single rulers with the new form of the city as urban areas were reshaped to suit the needs of absolute governance. He particularly connects

¹²¹ Bosker et al. The Development of Cities, 37.

¹²² Adorni, L'Architettura Farnesiana, 25. Cardinal Gambarà was followed by Venetian Marino Grimani from 24 April to 24 August 1545 when the first Farnese duke, Pier Luigi, arrived.

¹²³ Ibid., 29-30.

¹²⁴ Edmund Bacon, Design of Cities, (London: Thames and Hudson, 1974 reprint), 124-126.

the phenomena to capital cities, those used to impress others. One of the most important elements of Renaissance and then Baroque urban planning was the straight or axial street. According to Kostof, the street shifted from the earlier medieval form of space leftover between buildings to become a place in its own right. With straight streets and connected building planes the urban area became more visually monumental and thus a better support to ceremonial and political use of the space¹²⁵. The new streets in Piacenza, Strada Gambarara and Via delle Benedettine were attempts to modernize the city and enhance its status. Political instability made these gestures less than what they could ultimately have been.

Another development that drove urban redesign was the new types of fortifications required by shifts in war technology. The old curtain walls of medieval defences were no longer useful. Cities all over Europe built new earthwork-based bastioned walls. Kostof notes that by 1600 the improved bastioned walls, low-spreading, often star shaped, were the typical urban fortifications. New cities were also established and they often went with a street grid system while other new towns adopted the Renaissance ideal of radial-concentric streets¹²⁶. The defences of Piacenza were extended in the new style of bastioned walls under the papal representatives and the first Farnese duke. The two new streets were located along the edges of the city in relation to the geometry of the city walls, and did not interfere with the existing Roman or medieval street patterns.

¹²⁵ Spiro Kostof, The City Shaped, Urban Patterns and Meanings Through History, (London, Thames and Hudson, 1991), 215.

¹²⁶ Ibid., 111.

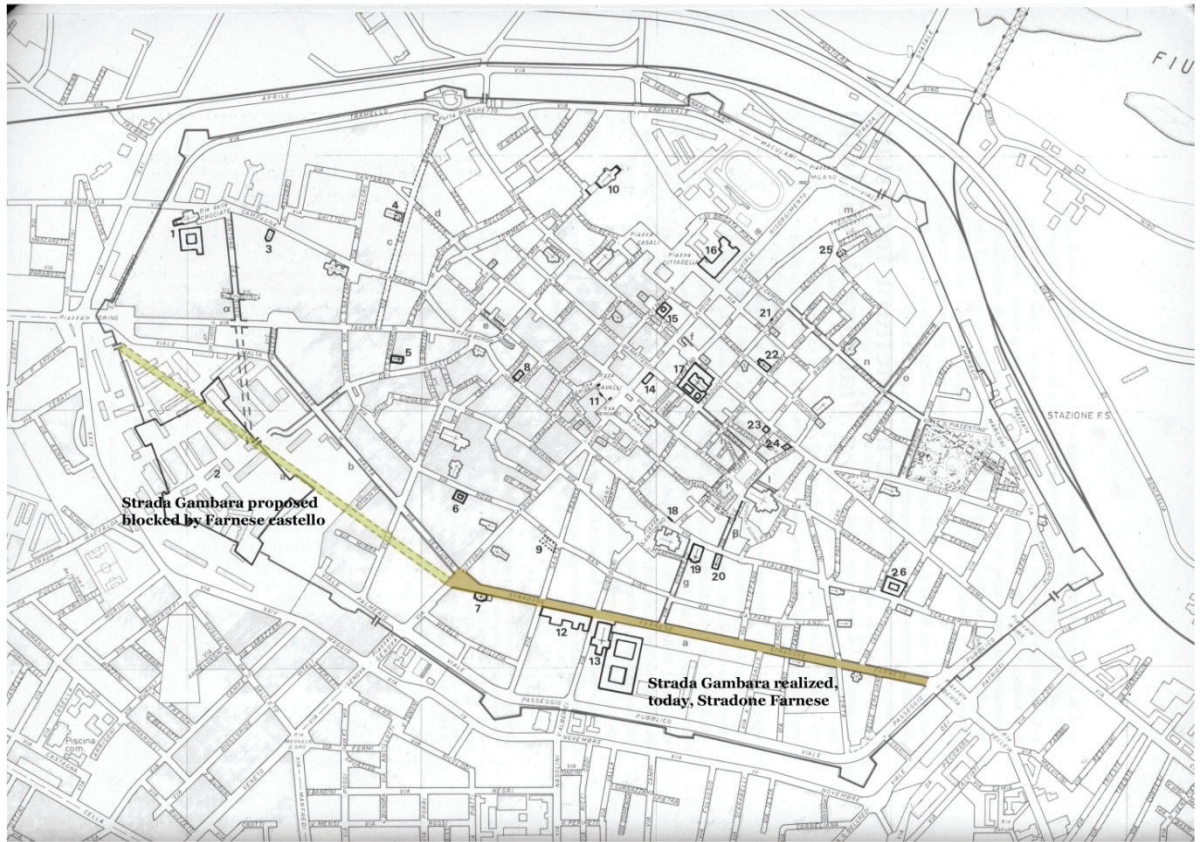


Figure 2-25: proposed and realized parts of Strada Gambarà on contemporary city map. Bruno Adorni, *L'architettura Farnesiana a Piacenza 1545-1600*. (Parma: Luigi Battei, 1982), 22-23.

Under Pier Luigi, Strada Gambarà was shortened from the original design. However, despite the loss of a grand organizing boulevard for the city, the street became very important in the annals of water provision in Piacenza. It is here, on this street, that a number of important canals enter the city walls. Along this new road rose large convents and monasteries with substantial garden spaces. This urban agriculture served several purposes. It supplied food for the residents inside the institutions, and may also have provided overflow areas for the canals. It kept housing away from the city walls, and created an open space along the inside of the wall, access that could be important in case of attack. However, it meant that the street never developed much urban life. It was occupied by long stretches of blank walls that served to hide the inhabitants of the religious organizations from view. Several monastic churches, including the large and

important San Agostino (est. 1570), do open onto the street and would have at least attracted people for masses and celebrations. The meeting of canals and street, in this new city extension, meant that the urban administrators had to deal with new infrastructure, broken infrastructure, and ongoing complaints about service and water rights abuse for many years.

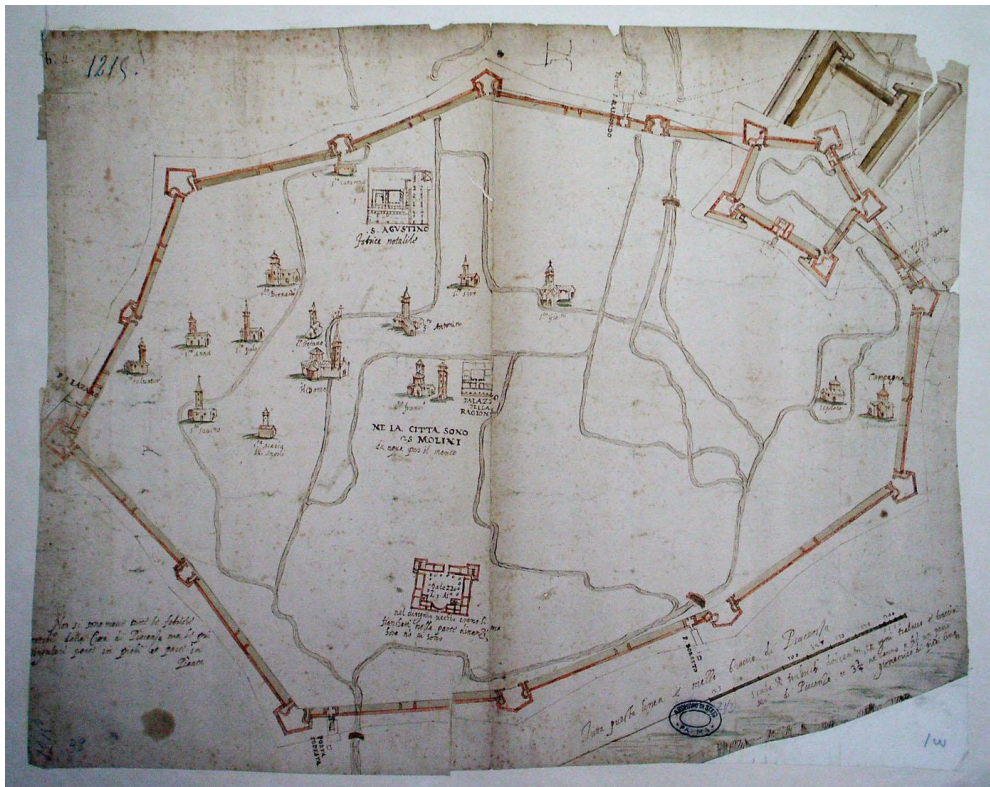


Figure 2-26: 16th century map with canals. North is to the bottom of the map. Archivio di Stato di Parma, Pianta prospettico – planimetrica delle città di Piacenza – disegno originale del sec. XVI, mappe 21/3, in nuovo 31.

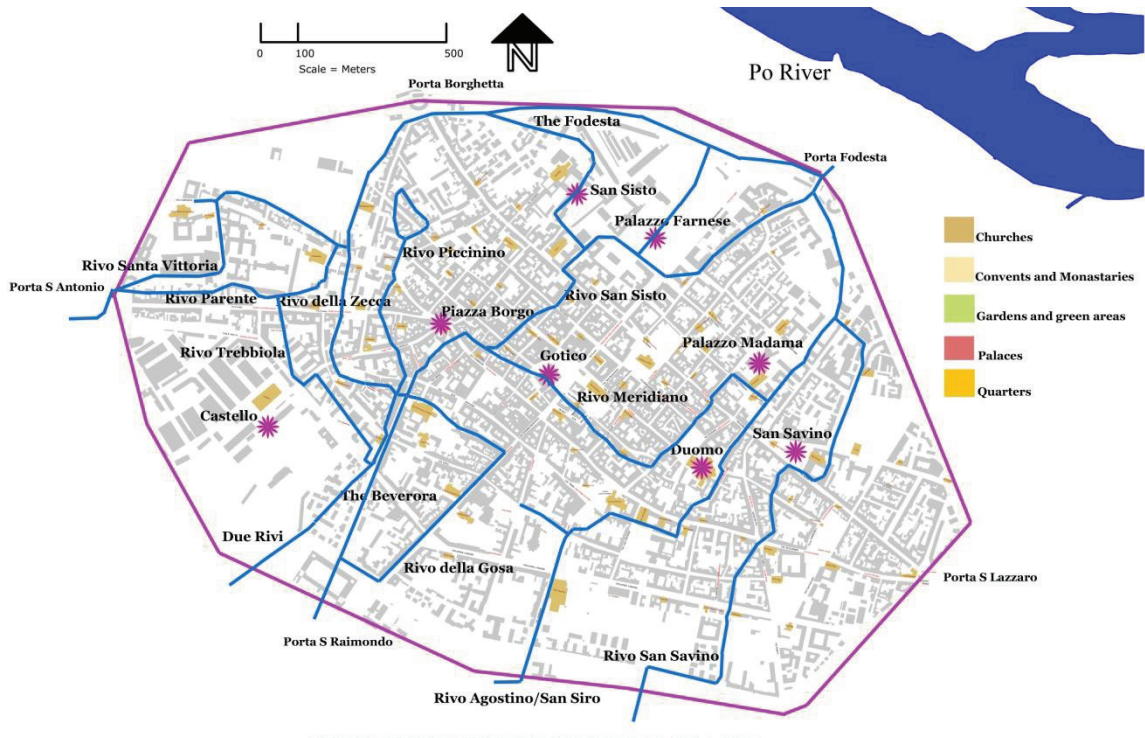


Fig 2-27: Farnese walls and gates with canal system and landmarks.

2.1.4 Summary

Authority over infrastructure was disputed, often shifted, and thus is difficult to tease out. Throughout these centuries, the church, the city government, and individuals all worked to sort out issues of power and control even as they created administrative and judicial structures as a means of working together. Infrastructure construction and management involved both rights and responsibilities and often required authorisation from the emperor, pope or later regional rulers such as the Visconti. This time of contested space and rights was the birth of civil administration of the infrastructure.

2.2 THE MANAGEMENT OF WATER

This section of the chapter explores how humans use water, modify hydrological cycles and patterns to achieve their goals, and construct infrastructure systems that respond to varied needs.

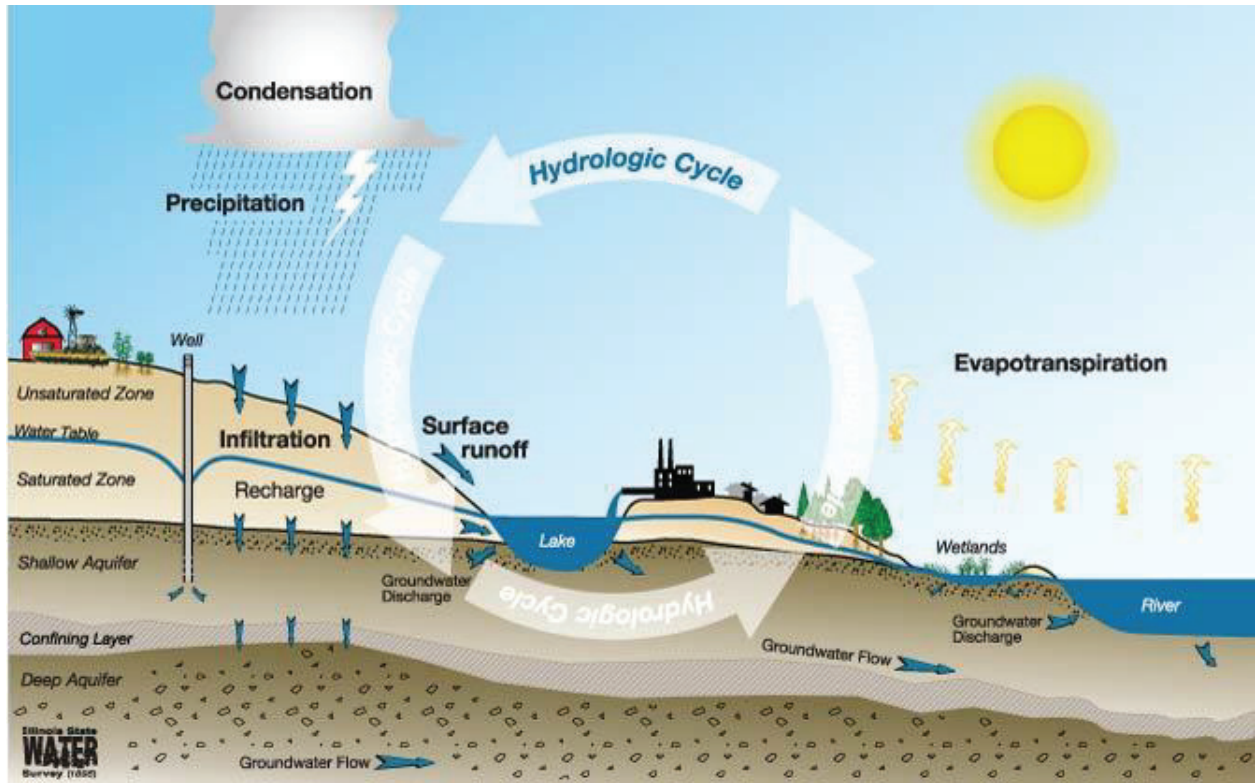


Fig 2-28: Hydrologic cycle. < <http://www.isws.illinois.edu/docs/watercycle/>>

2.2.1 Uses of water

The average human being needs 3 to 5 litres of water per day for drinking. Modern cooking and food preparation generally require 20 to 25 litres per day. With minimal sanitation the daily water requirement at the beginning of the 21st century rises to around 50 litres per person per day.¹²⁷ These figures make clear the need for urban administrators

¹²⁷ These figures are summarized from Peter Gleick, “Basic Water Requirements for Human Activities: Meeting Basic Needs”, *Water International*, 21 (1996):83-92. Medieval water requirements may have been as high or higher due to water dependent cooking techniques according to Squatriti. The big difference would have been water for sanitation purposes, especially flush toilets and private bathing facilities. For more see

to manage water resources within cities. It has been essential since the beginning of dense human settlements to maintain a constant and clean water supply to inhabitants. Lack of water in urban centres can lead to competition and frequently to conflicts. Those residents left without adequate water supplies suffer from a lack of sanitation and the diseases that arise from this deficiency. While cholera, dysentery, and typhoid fever may be the more commonly known water borne diseases there are a host of other maladies that can occur, particularly when sanitation facilities are non-existent or poor and drinking water becomes contaminated.

The amount of water available to an area is dependent upon the location of the site in relation to large weather determinants such as the jet stream, large water bodies and the topography of a region. While water covers 70% of the earth's surface, fresh water supplies are a mere 2.5% in all forms. This figure includes water in glaciers and the ice caps, not accessible for human exploitation. Some of it lies in deep underground aquifers and that have only recently become available for human use. Less than three tenths of all freshwater is easily accessible in liquid form on the surface of the planet¹²⁸. The amount of water available varies dramatically from place to place. Natural water storage, for example in glaciers, can provide stable water supplies to the cities within the watershed. A lack of natural storage means that humans may have to create systems that mimic nature in order to stabilize the water supply over the year. Erosion, deforestation, and the draining of wetlands (a natural storage system) contribute to how rain and snow affect an area and how water is retained or quickly runs off. These dynamics, both natural and anthropomorphic in origin, must be accounted for when systems are created to supply cities and their immediate countryside.

People in developed countries often miss the importance of water today because it is so easy for most of them to obtain it. Normally people just turn on a spigot and out it comes. Water mainly flows underground in artificial channels in our cities to supply homes and industries, and so it has become invisible to people. But before the use of

Paolo Squatriti, Water and Society in early medieval Italy, AD 400-1000, (Cambridge UK: Cambridge University Press, 1998), 42-43.

¹²⁸ Steven Solomon, Water, the epic struggle for wealth, power and civilization, (New York, NY: Harper Perennial, 2010), 12.

fossil fuels became the norm for power, water provided much of the energy needed for industrial purposes. Waterwheels of varied designs turned millwheels to grind grain, make paper, produce dyes for textiles, and felt wool. Water in channels and ditches was vital for agricultural irrigation which supported the existence of trade markets in nearby cities. Water and cities are intimately intertwined with water as a source of power, and a means to facilitate transport, industrial chemical processes, irrigation, and for domestic uses.

Humans seek to buffer themselves from the discomforts and difficulties inherent in their particular environmental context. Cities, as a material expression of human life, provide physical and social safeguards from the immediacy of the local ecosystem and its fluctuations. Dynamic ecosystems vary in the availability and amounts of water as well as how it travels through the watershed. Water then, occupies an interesting space in the city. It is absolutely vital for life. Any loss of supply would at once affect urban life from human hydration and sanitation, to industry, to the ability to fight fires. No one, even in a well developed urban environment, is ever removed from the immediacy of the need for water. The questions of water competition, administration and distribution are as old as human civilization, and over time people have developed social mechanisms to encourage cooperation and to resolve conflicts over water in urban areas.

2.2.2 Historical Human Interventions in the Hydrological Cycle

Around 5,000 years ago a number of ancient civilizations from Egypt to Mesopotamia, to the Indus Valley and northern China, began large scale, mass irrigation projects to promote agriculture¹²⁹. This, in turn provided the support needed to establish larger settlements and highly developed societies. The struggle to control water and use it to benefit a society can cause governments to rise and fall, determine the economics of a region, and keep inhabitants healthy or sentence them to early graves. Steven Solomon points out that the more successful civilizations were always marked by intensified productivity in their use of water.¹³⁰

¹²⁹ Ibid., 2.

¹³⁰ Ibid., 16.

These irrigation projects enabled the first large scale use of water and took much of the guesswork out of crop production. It mitigated and smoothed out the effects of erratic rainfall and river flows or overcame the problems with semi-arid or arid ecosystems. Heavy or long-term irrigation can create problems though, the most significant of which is usually the salinization of soils¹³¹. This process devastated a number of ancient societies, most famously the settlements of southern Iraq, where irrigation canals brought fertility to the soil and enhanced production for a time. The land became salinized and to this day, over 2,000 years later, has not recovered. Deforestation was another problem for cities that often followed the establishment of both agriculture and dense settlements as the search for firewood to provide energy would denude the surrounding territory. In such cases the watershed was changed and functioned differently, so that rains caused erosion where vegetation had been removed and soils were washed down hillsides often to fill in vital ports that fed the urban trade. If there was enough erosion and silt accumulation, over time rivers could be diverted and flow patterns changed. This added to the loss of soil and soil fertility and sped up the destruction of several ancient civilizations.¹³²

Because water, as a liquid, is difficult to manage, large scale waterworks generally required mass labour, often done by slaves or conscripts in earlier societies. Whether the labour was forced or paid, an administration that wanted to intensify water production had to invest in labour and materials. This outlay commonly required some type of centralized government or other institutions appropriate to the scale of the organization. In large scale hydraulic societies this meant a centralized regional administration as the political power and social organization expanded with the management of water for

¹³¹ Irrigation salinity occurs when land is over-irrigated, water is used inefficiently, and there is poor drainage. Water is allowed to pond for long periods of time or allowed to seep from channels, drains and other storage facilities. This increases leakage of the applied water to the natural ground water in the area and causes the water table to rise. When the water table rises it can release salts that are in the layers of soil. Evaporation then causes the salt to concentrate at the surface where the plants die for lack of oxygen. Drying out the soil may help. Conversely wet winters may also flush the salts out of the soil or back into the ground water. Information found at:

<<http://www.environment.nsw.gov.au/salinity/solutions/irrigation.htm>>.

¹³² Solomon, Water, 43.

irrigation and industry. The administrative bodies were vulnerable then if they are unable to provide the promised resource.

Entire societies have risen and fallen based on their governments' ability to provide inhabitants, rural and urban, with water. Various schemes have been employed to ensure water for irrigation of essential crops because if the crops failed, the famine that followed threatened the viability of the political organization. In urban areas failure to provide the water needs of inhabitants frequently led to disease outbreaks and chronic illnesses, and a loss of economic productivity.

2.2.3 Sanitation

Closely allied with an urban water system is urban sanitation. Any collection of non human and human animals generates waste, a source of pathogens and disease. Water has been the first choice in many places as the vehicle to remove pollution and waste from a city. City industries and residents create a diversity of pollutants. Even pre-industrial cities had artisanal processes that used chemicals or produced polluted runoff. Meat production and fish processing also created large amounts of organic waste materials that could not be left out in the open to decompose. Rotting vegetation could be found around small fields used for nearby and city-based food production. These pollutants had to be carried out of the city. The goal was to remove the pollutants rather than allow them to collect in ponds or low lying areas. Left in a pond or cistern the pollutants could seep into and contaminate ground water supplies. City administrators, when possible, aimed for systems that relocated the problem away from the urban settlement. Removal of waste and pollutants could be through location and zoning, that is, that industries that polluted were kept to the edges of the settlement and close to water sources that might remove the offensive material. Otherwise cities could divert water through channels that collected the waste and took it outside the walls, often to be deposited in a water source downstream of the city. Apart from municipal sewer systems, urban residents have often employed their own pit toilets and sewage cisterns; in essence they buried the offensive material. This could simply be a well dug beneath a cellar to receive the sewage from the household above. A cistern might serve several homes and be located in the street for easy access

and clean out. Due to the connection between water brought into a city and sewage or pollution taken out of the city, a single urban administration might care for both systems.

By most accounts, city life in Early Modern Europe was a smelly one. This could indicate that people in cities were accustomed to smells that we today would find offensive, that the experience of a noisome city was normalized and people did little to address it. However, as Carlo Cipolla demonstrates, smells and odours were of primary concern to urban officials in Medieval and Early Modern Italy. Pollution in the form of dead animals, runoff from industries, and waste from food processing was a source of visual and olfactory distress for urban residents thus urban administrators sought to remove it. The understanding of illness at the time connected smells to sickness and therefore made removal of odour-causing materials of critical importance¹³³. Other than shovel refuse out in carts, water was the first choice for removal of pollutants in urban situations. And cities, historically, have not been too fussy about where the pollutants ultimately ended up, as long as it was away from their walls. Water allows pollutants and sewage to flow downstream with minimal effort.

2.2.4 Infrastructure and Technology

Societies often seek to both collect and store water, in imitation of natural storage and/or to divert water from one locale to another, in imitation of rivers and streams¹³⁴. Methods must be site-specific but they tend to follow along the general approaches of collection or diversion or both. The intent of collection methodologies is to slow down water flow either for storage for later use or to allow it to percolate into the ground and restore ground water levels. Diversion is a means to relocate water from water-rich to water-poor locales frequently to enable agricultural production.

The way water is naturally delivered to a locale determines the anthropomorphic means of collection and diversion. On rivers, water is collected and stored in dams. While

¹³³ Carlo Cipolla, Miasmas and disease, public health and the environment in the pre-industrial age, (London: Yale University Press, 1992), 7.

¹³⁴ Natural storage is not static; the water may be moving though, frequently very slowly. Such natural storage would include glaciers, lakes and ponds, and wetlands. Underground it includes aquifers and underground rivers which may store water from prehistoric times.

gigantic concrete dams are a fairly new approach, earthen banks and dams and small catch dams are old technologies. These allow water to be stored for later use, enhance ground water recharge, and provide a controlled vertical drop that may permit energy production. River water is also frequently diverted from one place to another. Humans create new river beds with soil, concrete, terracotta or stone, to move water around to water-poor areas. These canals and dams require maintenance to deal with silt build up as well as to mend cracks, contain leaks, and address material degradation.

Wetlands are natural catch basins and storage ponds. They are often located at the end of a river in the delta. Vegetation holds back the water for a time, and creates a vibrant ecology that responds to floods and droughts with water storage. Wetlands have the capacity to mitigate flood events with the space to slow down and contain the running water. However, humans prize the rich soils present in wetlands for agriculture and but suffer from diseases like malaria prevalent in low lying areas. Wetlands are often drained and lose the ecological balance that provided essential water management. Left with fast-flowing rivers and increased flood events the water must then be administered through canals, irrigation, dams, and managed releases.

When without an accessible river or lake for water people have often turned to collection and storage of rain water. Historically rain water has been collected in ponds, cisterns, and on roof tops. The principle is to thwart rain runoff from a surface and to channel it into a container for storage. The rainwater can then be used during times of low precipitation and drought. This method is frequently used in places like India with its monsoon rains, which are heavy rain events followed by a season of low rainfall. In some places villagers in India have revived old methods of collecting rain water from the monsoons in ponds to be gently and slowly released during dry periods¹³⁵. In semi arid southern Italy methods to divert and store rainwater have existed since ancient times, sometimes simply in underground drainage tunnels that lead to cisterns or pits. Even the very common agricultural approach of terraced planting can be understood as essentially a tool to harvest and store rainwater. Pietro Laureano comments that such harvesting and

¹³⁵ Fred Pearce, When the Rivers Run Dry, Water – the defining crisis of the twenty-first century, (Boston: Beacon Press, 2006), 261-2.

storage systems were common across the ancient Mediterranean cultures as they dealt with their local ecologies¹³⁶.

Human settlements have long made use of groundwater. Generally, when people refer to groundwater they actually are talking about the top layer of water in the soil, the layer that determines the water table. This is the critical layer for shallow wells. Modern technologies have allowed humans to access deeper and deeper sources of groundwater, that include deep aquifers which were unavailable before electricity and pumps. If the groundwater level is high, a well can be easily dug to access it. As groundwater levels fall wells must become deeper or be abandoned. Wells are subject to seepage from the ground and water around them. This can create pollution problems in urban settlements if sanitation facilities are too close to clean water wells. Groundwater can also be accessed through variations of the ancient Persian technology of *qanats*¹³⁷. These are gently sloped horizontal tunnels into hillsides to access ever flowing streams. With qanats the hills are used as natural storage containers for rainwater. The technology of the *qanat* provides the access to the container, and the tunnel flows into either a well or fountain. This was the technology employed in Siena in response to its own arid and hilly urban site. The people tunnelled into the hills where the water was available and allowed it to flow into fountains to supply the city. Many societies used a variety of water diversion, collection and storage strategies to create redundancy in their systems in order to enhance resilience. This is certainly true of many cities in Italy in the late medieval and early modern eras.

2.2.5 Regional History of Water Control and Use

The Romans had several hundred years of engineering expertise and experience in water management when they went out to establish colonies. By the 2nd century BCE they had developed concrete, a material that greatly aided the construction of canals and

¹³⁶ Pietro Laureano, "Traditional Knowledge Role for Security and Mitigation of Water Conflicts" in *Options Méditerranéennes*, A #83, (2008):173-183.

<<http://www.ciheam.org/index.php/en/publications/options-mediterraneennes>>

¹³⁷ *Qanats* have different names in different parts of the world though the ancient Persians are credited with developing the technology. They were frequently used in the Middle East and North Africa. In China a qanat is called a *karez*; in Arabia, *aflaj*; in North Africa, *fogarra*. Fred Pearce, *When the Rivers Run Dry*, 276.

aqueducts for the transport of water¹³⁸. In the first century BCE the Romans also produced new designs for waterwheels. They invested heavily in gristmills to provide city dwellers with grain. They engineered the vertical waterwheel, which multiplied power through the use of gears and increased the production of bread. The provision of fresh water to the Roman metropolis became a state responsibility and a legacy that cities like Piacenza could draw upon for their own urban space and organization.

Alongside their technological achievements, the ancient Romans devised laws to govern water use. Senator Julius Frontinus who became Rome's water commissioner in 97 CE wrote a long report on the water facilities of Rome¹³⁹. In his report he included a number of comments about water usage, grants, rights, theft and fraud. In ancient Rome, water was both a public and a private venture. The urban administration provided water to the general populace in basins and fountains while private individuals could obtain grants from the emperor for service from the various sediment and settling tanks located around Rome. Frontinus complained about water theft through unauthorized pipes that punctured the holding tanks and other water mains. He described fraud by the contractors responsible for construction of the system that ultimately led to reduced water flows. He wrote of the employees of the empire who monitored and policed water usage, and were found to have diverted water from one source to another to cover their own sale of water for personal profit (section 9)¹⁴⁰. He notes in another instance that staff had failed to maintain a consistent pipe size as a means to commit fraud¹⁴¹. This legacy of water rights granted by imperial authority with commissioners to manage the system would carry over into cities like Piacenza and function centuries after the fall of the Roman Empire.

The twofold task, to eliminate water in marshes through drainage and to supply the area through irrigation, was a method the Romans took to their colonies. Like areas around Rome, the marshes around Piacenza had to be drained to rid them of mosquitoes that cause malaria, and to make them useful for agriculture. This was a long-term

¹³⁸ Solomon, Water, 85-7.

¹³⁹ Ibid., 88.

¹⁴⁰ Sextus Iulius Frontinus, On the Water Management of the City of Rome, Section 9, trans. R.H. Rodgers, 2003, <<http://www.uvm.edu/~rrodgers/Frontinus.html>>.

¹⁴¹ Ibid., Section 31-34.

investment and one that took years to complete. The Roman use of irrigation canals all over Italy to augment natural rainfalls and to enhance agricultural production is known as *centurizatione*.

For many years, in the area of Piacenza, it was considered healthier to live in the lower hills of the Apennines, in the Roman provincial administrative centre of Veleia, rather than down on the flats. But once drained the fertile marsh soil needed access to water in a timely way, something which was supplied and managed through the multitude of irrigation ditches. The Roman engineers who went out to extend Roman rule understood both infrastructure and water management. They knew to build roads with good drainage, to bring water to a city through canals and aqueducts, and to remove pollution from urban centres through water channels¹⁴². They brought this expertise to places like Piacenza in 218 BCE when they arrived at the Po River. They drained the surrounding wetlands and established irrigation canals for agriculture in the rich alluvial delta soils. They provided the city with a navigable canal, the Fodesta, to facilitate trade with a sheltered urban port, and to enable avoidance of the frequently flooded and less manageable Po River.

The main industrial use for water, in ancient cities and later in pre-industrial Europe, was to provide energy to turn mill wheels¹⁴³. Mills were used for everything from producing processed food stuffs to the manufacture of textiles on which many northern Italian cities made their wealth in the Renaissance. Water wheels ranged from simple to complex, small to large, and could connect to grinding wheels to make flour or to activate hammers for felting wool. Many industries in medieval and early modern Europe made full use of available water energy to power multiple processes. A lack of water to generate such industry meant a city stagnated rather than grew, and failed to develop or become rich. Canals of all sizes became a means to transport water from areas of abundance to those that lacked. Waterways like those in cities such as Milan, Bologna, Piacenza, and other northern Italian cities required intensive labour to organize, create

¹⁴² Solomon, *Water*, 75. Pagliani writes about Roman era drain and drainage canals found in Piacenza in *Piacenza, Forma e Urbanistica*, 16 and 59.

¹⁴³ Waterwheels and mills were a legacy of the Roman empire where they were used especially to grind grain. For more see Brian Fagan, *Elixir, A history of water and humankind* (New York: Bloomsbury Press, 2011), xxii, 172, 184, 311, and 316.

and manage. In late Medieval Europe the engineers of northern Italy had a venerable tradition to draw upon to help make their mark on the landscape of water management. By the sixteenth century, for example, Piacenza had up to 22 canals that ran from the River Trebbia through the countryside with some that went on to supply the city¹⁴⁴.

Once an urban administration found a source, or multiple sources of water, it had to be shared and monitored. Sources and distribution of water could be public or private. Sometimes a city would provide public fountains or wells, as well as publically administered water channels. Sometimes the rain collection was done privately along with private wells and fountains. And in some cases, frequently in Medieval Italy, the system was mixed and involved local associations organized around specific water infrastructure, especially infrastructure that involved great expense to construct and maintain.

¹⁴⁴Gustavo Della Cella, Delle Acque di Trebbia nel Territorio Piacentino, Note alla Sentenza pronunciata dal Tribunale di Piacenza il 29 Luglio 1902 nella Causa civile formale promossa dalla Società del Rivo Gragnano e Filzano contro il Comune di Piacenza. (Piacenza: Stab. Tipografico V. Porta, 1902) 45.

2.3 PIACENZA AND ITS CANALS BEFORE THE *CONGREGAZIONE SOPRA L'ORNATO*



Figure 2-29: Trebbia from canal beginning to city, XVII century. The map starts above Colonna (the red circle closest to the top) follows through the Partitore and into the city. City canal names, walls, gates, and mills have been highlighted. As is typical of the time, north is to the bottom or lower part of the map. Nuova A: 6405/25, Mappe e disegni ASPc.

2.3.1 The waterworks at Colonna and the jurisdictional divide

Gustavo Della Cella maintains that the Romans may have constructed the first Rivo Comune, the main canal to the city from the Trebbia River. He cites a number of historical references to ground his assertion of the antiquity of the system. By the time of the Farnese, the urban water supply had long run from the Trebbia River through the site called Colonna, the start of the division into two main urban channels just west of Gossolengo which was located at least 10 km from the city¹⁴⁵. He also notes that when the monastery San Sisto was founded in 879, it was given land along the public road that went out of Porta Milanese to the port on the Po River. He contends that documents mention a mill and Rivo Beverora in the vicinity of Santa Brigida to demonstrate the early construction of the urban canal system. He gives 1139 as the date when the Comune began to use the water of the Trebbia with a new canal into the city¹⁴⁶. The system obviously developed over many years, as the convents and church institutions took the lead to revitalize and expand the Roman infrastructure. This then was taken over by the city when it became organized as a legal entity and gained the power to control the waterways.

Maria Cademartiri describes the system as it ran from the Trebbia to Colonna and on to the city. She states that water for the city came through Colonna by way of a channel made of terracotta and stone. There was a hydrometer to measure the water level and regulate distribution. The water out of the Trebbia was a single channel called Rivo Comune. It then divided into two channels, Rivo Comune and Rivo Piccinino. The branches reunited at Partitore which slowed down the flow. There was a re-division there where Rivo Comune divided into six branches and Rivo Piccinino into five as they flowed through the countryside. The canals further divided on their way to the city and several had offshoots for irrigation in the countryside. Another canal that flowed separately into the west edge of the city was the Rivo Parente. Not all of the canals that left Rivo Comune and Rivo Piccinino around Colonna actually came to the city. Once

¹⁴⁵ Colonna, the site of the major canal that takes in water from the Trebbia was located beyond Gossolengo, 9 km southwest of Piacenza.

¹⁴⁶ Della Cella, *Delle Acque di Trebbia nel Territorio Piacentino*, 11.

inside the city walls, the situation shifted to include an ever-expanding network of canals, conduits, small channels, sewers and other infrastructure¹⁴⁷.

It is not a simple matter to figure out the urban canal system and its relationship to the channels in the countryside. The city wall was the dividing line in most maps, which makes connection between rural and urban systems difficult. Different maps vary not only in canal locations but also in their names. Within the walls, names changed over time and over the course of the canal, as it moved through the urban space. In the archival documents the same canal or portion of the canal can have several different names depending upon the writer. Sometimes older names are brought forward, at other times the name of the smaller canal offshoot may be used and at other times it is not. On maps sometimes the canals looped around and even appear to have crossed over one another.

Vaciago describes the division at Colonna and then adds that downstream of Colonna, after the mill called Tre Ruote (3 wheels) the main Rivo Comune taken from the Trebbia River divided into Rivo Comune on the right and Rivo Piccinino on the left. These correspond to the ancient Roman canals with the same names. She agrees with Della Cella that Rivo Comune then subdivided into six smaller channels and Rivo Piccinino into five. She claims that Rivo Piccinino then split into Rivo Piccinino, Rivo San Lazzaro, Rivo San Savino, and Rivo Santa Vittoria but fails to name a fifth canal. She notes that the first diversion from Rivo Comune is Rivo San Siro with another one in the immediate vicinity of the ancient city walls called Rivo San Cristoforo. She does not designate the other four canals that would make the total of six from Rivo Comune¹⁴⁸.

Colonna remained an important site for the city as the main waterworks and intake point. It was the point of division in terms of water jurisdiction and frequently the site of

¹⁴⁷ Cademartiri, “Lo sfruttamento delle acque”, 72, and Della Cella, Delle Acque di Trebbia nel Territorio Piacentino, 45. The total number of canals managed by the Comune was 22 with another one added in the late 15th century.

¹⁴⁸ Giuseppina Vaciago, Il regime giuridico delle acque di Trebbia nella storia, tesi di laurea in Giurisprudenza, Facoltà di Giurisprudenza, Università Cattolica Sacro Cuore, 1957/58, p 36. On page 25 she cites the 1470 regulations that reference city authorization over 11 urban canals.

conflicts and conflict resolution. The Trebbia also provided a significant amount of irrigation water for agriculture in the plains around the city; thus it was inevitable that there would be power struggles over the control and management of this system. This struggle is most evident in the number of reforms to the system of administration over the years.

2.3.2 The Regional Politics and Context of the Urban System in the 1420, 1470 and 1585 Reforms

The urban canals existed within a political as well as an ecological watershed. The Romans created the first canals from the Trebbia, and once they had conquered the local tribes, were the owners of the whole watershed. They did not have to negotiate with anyone else when it came to management of the urban water supply. However, things had changed significantly by the time of the Farnese dukes. Valeria Poli's book on the subject synthesizes the available material on the evolution of the water system in Piacenza from the standpoint of political powers, finances, and infrastructure management outside of the city walls. Her material forms the basis for the synopsis in this section¹⁴⁹.

With the organization of the municipal government in the 12th century, the city did all it could to extend its control into the countryside and over the water supply in existing canals. This power was challenged with the agreement in 1420, which gave control of the urban canals to the Landi feudatories at Rivalta on the Trebbia River. The fact that the millers' *Paratico* could make this sale of water rights demonstrates how the authority of the city government had been weakened over time, especially with the advent of the Visconti rule from Milan¹⁵⁰. The Landi were supporters of the emperor (*Ghibelline*) and enjoyed extra power and rights because of that relationship. While the city had never really ruled the upper parts of the Trebbia, which were controlled by Genoese feudal families, the transaction of 1420 showed a shift in the city's relationship to local feudal families, especially the four principal families that ran the city: the Landi, Anguissola, Scotti and Fontana. These families, with their power based in the countryside, also had to

¹⁴⁹ Poli, *Le acque di Trebbia*, the section on the early history of the Trebbia water system summarized here is in pages 26-46.

¹⁵⁰ The *Paratico* was the organization of millers.

guarantee sufficient water to the urban mills and kitchen gardens through their urban administration. The 1420 sale created problems for the city that would only finally be addressed well into the Farnese reign¹⁵¹. The agreement with Count Landi specifically gave him control of the water that came from the Trebbia and supplied the urban water system of Rivo Commune and Rivo Piccinino. For his part, the Count was to ensure that there was sufficient water in the canals to power the urban mills and presses. According to Poli, this agreement gave the Landi family consortium a strong strategic relationship with the city and created the context for future disagreements.

In 1470, the city was desperate to find a way to settle all of the ongoing lawsuits from millers and other citizens due to the disruption of the urban water supply that originated from the Landi control. On 19 November, 1470 the city government came to an agreement with the Duke of Milan, Galeazzo Maria Sforza that allowed for the appointment of a *Referendario*, a judge over water disbursement. This new appointee was to find ways to deal with water rights and to resolve conflicting interests, however, the Landi continued to have significant power. This contract established that the Landi retained power over the mouth of the urban canals where they received their supply from the Trebbia River. But a deputy and the judge would now confirm and rule over the water rights of the city and uphold the ancient rights to the eleven urban canals that flowed from the two main channels. All were to be kept well-maintained and in good repair. In the dry season, the urban canals were to be fully provided for. It was mandated that there be sufficient water to run the mills, irrigate urban gardens, and cleanse the city in order to maintain the health of the citizens, according to ancient statutes.

Provision was made in this new agreement to address continual water fraud through new oversight. The judge had the power to open and close locks, but the agreement stipulated that the irrigation canals also had to be provisioned. These channels were owned by feudal nobles and were sourced from the urban canals in the countryside. During the dry season (*acqua estiva*), canals like Rivo Parente and other milling or

¹⁵¹ Poli, Le acque di Trebbia, intro by Piero Castignoli, 5-7.

macinatore canals had to be fully supplied at the cost of the irrigation canals¹⁵².

Supplying water to the mills was critical. The canals from the Trebbia supported paper mills, presses for oil, grain and cereal mills, and industries that processed wool. All of these industries were vital to the economic health of the city¹⁵³. The mechanisms of mills and presses could be damaged due to inadequate or irregular water flows, and a cessation of milling meant a loss of tax revenue to the city. The agreement affirmed the Landi's role but also sought to impose new limitations and checks on Landi power with new officials who answered to the city or duke.

Things did not really improve with the new reforms. In 1484 there was extraordinary bad weather with hail, drought and food scarcity, along with the plague. The situation was made worse when Count Manfredo Landi, despite the prayers of the citizens and offers of money, refused to allow the water to run as it should into the city. Poli contends that this was a show of force by Count Landi against the powers of the city. The city council fought back and sought more authority over the urban canals. On 14 July 1487, they obtained it from the Duke of Milan, Ludovico Sforza, the ultimate authority. At this point, two offices were set up to maintain honesty in the system, a *Referendario* (a judge) and a city engineer (*ingegnere della Comunità*) to oversee the water supply. The engineer was to measure the levels of water in the canals, and then make decisions about the allotment of water to varied users, and check that each canal was correctly supplied. The *Referendario* was to choose the engineer. City appointed-deputies were also selected to counter the power of Landi-employed deputies. Yet the conflicts continued. In 1537 the city sent two deputies to Colonna to measure water levels, determine distribution to users, and manage the water supply.

¹⁵² *Ibid.*, 120. In the dictionary of terms, Poli defines *acqua estiva* as the period from 25 March to 23 April, a time to clean out and repair the canals. Then from 23 April to 31 August, as the time when canals were used for irrigation as well as milling. And finally from 31 August to 8 September when the water had to go first to milling cereals. The other season of the year was *acqua jemale* which ran from 9 September to 23 April when again, mills took precedence. Within the seasonal divisions was the *quindicena*, the division into particular days and times, weekdays versus weekends, when irrigation canals could be used.

¹⁵³ Cademartiri, "Lo sfruttamento delle acque", 78.

The first Farnese duke, Pier Luigi failed to act on water supply issues before his assassination in 1547. During the hiatus from Farnese rule, while under imperial authority, the city continued its longstanding struggle with the Landi. On 12 July 1552, there was a complaint about insufficient water for the mills. On 14 July there was an investigation into the way the water was distributed from the Trebbia. On 16 July the city suffered from a heat wave and lack of water. In response, an engineer was sent out to Colonna to address the situation. Similarly, on 5 August 1556, the city wrote a letter to the Count Landi to plead that he allow the urban water supply to flow as it should.

On 15 September 1556 Ottavio Farnese regained control of the city of Piacenza, but not the citadel, with the signing of the Treaty of Ghent¹⁵⁴. He then appointed a Commissioner, Francesco Paciotto of Urbino, to oversee the rivers and torrents of both Parma and Piacenza and confirmed positions held by other officials. The city now found itself locked into conflict with the ducal appointee and sought, through complaints to the duke, to gain more control and authority over the urban water supply. This disagreement escalated in 1568 when the city accused Commissioner Paciotto of absenteeism and of decisions made without the license and approval of the city council. The municipal officials may well have had a case, for Paciotto was a busy man. He was a famous civil and military architect who worked on several projects for the duke that included fortifications in Flanders and in Piacenza, Palazzo Farnese and the castello. A minor noble himself, he was also known to be a difficult person who failed to follow the rules of courtesy with nobles above him. He may simply have offended the feudal dignitaries who sat on the city council¹⁵⁵. On 4 June 1568, the city requested that the duke devise a new system to manage the urban water supply, one that would benefit the public and take into account the universal interests of the residents.

In the midst of these unsettled negotiations about control of the water supply, the city invested in the infrastructure with new excavation done for Rivo Comune. The city was

¹⁵⁴ The Spanish soldiers stayed on in the citadel until 1585.

¹⁵⁵ Ian Verstegen, "Francesco Paciotto, European geopolitics, and military architecture", *Renaissance Studies*, 25, #3 (2011): 393-414. The note about how he failed to follow the norms of courtesy is on page 400.

given the power to oversee this work. Poli describes how between 1569 and 1581, the city gradually took more and more control of the canal system in a functional way. It allowed the city to assume the power and authority it needed to guarantee its water supply without a direct confrontation with the Landi family. During that period, the city also assumed more of the financial control of the system. When the new canal was finished in 1569, the city paid the 300 *scudi* fee for the engineer even as the canal was delivered to the authority of Count Landi. When a second excavation was done in 1571, all of the expenses were incurred by the city, but maintenance costs of the old channel were shared with the Landi. The urban government paid for its new infrastructure in the countryside with a tax on the city bread market and from funds that had been collected for fortifications. New infrastructure did not solve the problem of inadequate water. On 5 July 1575, there was a lack of water to the city. Accusations were made of unauthorized sales of water by the Landi that deprived the city. The Governor sent out people to inspect the canals and locks and charged the cost to the Landi.

The power struggle did not abate. There were complaints of inadequate urban water supply that were countered by Count Camillo Landi with an explanation that the infrastructure was in bad shape and did not function as it should. On 24 July 1578, the millers complained about damage due to water theft from the canals that ran into the city. An engineer's report highlighted the problems with the construction of the infrastructure, that it was inadequate to do the job, by design allowed for fraud, and did not allow enough water to flow to the city. In 1579 money from the salt tax was used to rebuild parts of the system. In 1582 problems were bad enough that city officials called for the duke to visit the waterworks with them in the countryside.

The situation came to a head in 1582 when a conspiracy was discovered against the duke. It included two representatives from the Landi family, Claudio Landi of Bardi and Muzio Landi of Rivalta. As the Landi had been involved in the assassination of the first duke, the new plot allowed Duke Ottavio to move against them. The year 1582 is understood to be when the power shifted; from that point on the city had to negotiate its water issues with the Farnese duke alone. For some time offices were in shift as attempts were made to create a new system that would reconcile competing interests. On 7

November 1584, the city council had to send two engineers to visit Rivo Comune in the countryside due to flooding. In 1585 the city council requested that the duke act on the problem of water theft. At the same time, there were plans for new infrastructure as the duke and the city negotiated a new agreement of water management¹⁵⁶.

The 1585 agreement *Ordini sul reggimento delle acque di Trebbia*, between the duke and the city ended the Landi role in control of the Trebbia River-based urban water supply. It resulted in a split jurisdiction with two water commissioners: one was responsible for primarily irrigation canals, above the city water works at Colonna, and the other was in charge of the urban canals that ran from Colonna. Both were subordinate to the governor of Piacenza. The authority, power and jurisdiction over the water supply also allowed for custody of woodlands and included a mandate to maintain bridges. The agreement provided for the prosecution of those persons that offended against water rights, and it made stipulations for the maintenance of the water infrastructure and the means to finance that work. While the new commissioners had wide powers to obtain needed money and labour when necessary to maintain the infrastructure, the real financial power was given to the city. However the city administration was not yet completely satisfied. In 1591 complaints went to the duke about the use of outsiders as commissioners. It was argued that their lack of local knowledge disqualified them from making wise decisions. The duke responded favorably and a member of a local aristocratic family, the Arcelli, was appointed to the position.

In 1586 the city proposed new work to ensure the urban water supply. Duke Alessandro, who had just come to power, gave the city broad powers to finance and execute the work. The duke, who was raised in the Spanish court, was famous as a general in the war in the Low Countries. Consequently, he never actually lived in the duchy while he was duke, and his son, Ranuccio administered the duchies via letters from his father. Nevertheless, the city had to go to the duke or his son Ranuccio with requests for financing when funds were insufficient. The city tried to get more money from the church for work on canals on both sides of the city walls, but the Pope was not open to an

¹⁵⁶ There is no indication of the identity of the persons who negotiated this new deal with the duke for the city.

increase in fees although he commented that the Bishop could compel secular clergy to make an increased contribution. In 1589 and 1590, there was significant infrastructure failure, and engineers were sent to find new ways to get water into the city. The implementation of the new water regime of 1585 was still fraught with complaints, fraud, water theft and infrastructure breakdowns. Despite those problems the agreement was re-issued several times into the 17th century by the dukes to reaffirm the management regime¹⁵⁷.

According to Subacchi, upon the arrival of the first duke, in 1545, the urban population of Piacenza was just below 25,000. By 1618 the population had risen to 33,000. The plague of 1629-30 devastated the city with a drop to 16,744 inhabitants in 1631. In 1737, the end of this research period, the urban population was 28,056¹⁵⁸. The author further notes that while Duke Pier Luigi arrived in a well-off and thriving city, rich with artisanal activity especially textiles, by the 17th century, Piacenza, like most of northern Italy, had entered an economic decline. In the case of Piacenza, Subacchi cites a loss of capital investment and entrepreneurship with a move to invest funds safely in landed property as concurrent with the decline¹⁵⁹.

This is the larger political watershed of the urban canal system. The urban canals inside the city walls were the extreme downstream portion and final part of the larger system. Any malfunction, intentional or otherwise, upstream especially at Colonna, created stress and distress further downstream. Throughout the 15th century, the city had a large problem to solve, as someone else had the power to turn off the tap to its water supply and affect the up to 30,000 residents with a lack of water. The Trebbia River diminishes in the summer and had to be managed in ways that dealt the variation between seasons. That situation already required an agreement to cooperate and to abide by the rules. The political infighting for power on a larger scale, which at times held the water supply hostage, would only have exacerbated the situation. Lack of cooperation, on the basics of

¹⁵⁷ Poli, *Le acque di Trebbia*, 51.

¹⁵⁸ Paola Subacchi, *La Ruota della Fortuna*, (Milano: Franco Angeli, 1996), 32-33.

¹⁵⁹ *Ibid.*, introduction.

the urban water supply at Colonna or further back at the Trebbia, meant potential conflict within the city as lack of resources threatened livelihoods and residents' well-being.

2.4 SUMMARY

Water management, no matter what the context or methods used, requires cooperation between parties at varied geopolitical scales. Unless arrangements are made to share in a way that enables people to meet their water needs, conflict can erupt. It was in the best interest of all involved for urban areas to develop means of watershed management to service their industries and local agriculture. The long history of Piacenza demonstrates that despite shifts of power between local nobles and trans-border entities, water had to be managed. The infrastructure had to be kept in good repair and replaced when necessary. And, if conflict threatened the urban supply, in a significant way, then efforts had to be made to resolve the situation. This is the story of human settlements, no matter where they are located. Piacenza, and the administration through the Farnese years, exemplifies how this city resolved these issues technologically and administratively.

CHAPTER 3: RESEARCH INTO ITALIAN WATER SYSTEMS AND DOCUMENTS

This chapter explores the historical research on other cities in northern Italy to better understand the varied approaches by urban managers to different ecological contexts before and during the study period. This is followed by a list of the sources used for the research into the system in Piacenza.

3.1 HISTORICAL WATER RESEARCH ON NORTHERN ITALIAN SYSTEMS – MULTIPLE APPROACHES TO DIVERSE ECOLOGICAL CONTEXTS

All of Europe experienced a population boom after the 11th century. As cities grew, a body of law was developed to cope with water supply and urban sanitation. As urban officials grew in experience, they developed their abilities to manage cities of greater size and density. They sought to minimize the disruption of ecological stresses through planning and municipal arrangements meant to administer the infrastructure and water supply.

The power to legislate and enforce regulations about water usage is essential for a large, dense settlement to survive and function. While many people are inclined to care for the limited urban resource, there are always some who will challenge the use of water either by overuse or engagement in acts that damage its purity. This puts others at risk, frequently in danger of disease and death, due to waterborne illnesses. The legal frameworks for water and sanitation are important clues into the dynamic relationship between social interactions and spatial outcomes in settlements.

In Italy, the water system of Rome, from its ancient days through to the revival under the Popes during the Renaissance, has received significant investigation. It is well-documented archeologically and historically. More recently research has moved onto other Italian cities to explore their individual methods to obtain and supply water to residents. The issue of sanitation has received less attention, though it does come through in work on plagues and disease. In order to understand the water and sanitation systems employed in Piacenza, it is helpful to examine the work on systems in other northern and

central Italian cities. We find that systems vary technologically according to the ecological context of each city.

As Italian cities expanded in the late Middle Ages with the cessation of hostile disruptions and the development of new political structures, urban administrators faced the task of providing sufficient supplies to maintain populations and develop industry. Increased urban density often requires a more public or collective approach to water and sanitation management, unlike in lower density or more scattered settlements. Dependent upon their geographic location, position within the watershed, and geomorphologic characteristics, each city had to find water and get it inside the city walls for use by residents and industries. Once there, decisions had to be made about the distribution of the precious resource, both publicly and privately. Some cities had abundant natural resources and others struggled to provide a minimum of water to residents. City managers frequently sought to have multiple systems to provide sufficient back-up resources during droughts or shortages.

The physical space of water in the city often depends upon the geography of the area. The topography and watershed geomorphology differs greatly between central and northern Italy. In the north, where cities such as Milan and Bergamo are located, the streams, springs, and rivers are fed with glacial run-off and snowmelt from the Alps. Cities in Lombardy, on the north side of the Po River used this Alpine water supply to create canals to furnish urban populations with water. On the south side of the Po River, the location of cities including Piacenza, Parma, and Bologna, there are characteristic torrents that vary in water volume between seasons dependent upon the snowmelt and rainfall from the Apennine Mountains. Further south into central Italy cities are often perched on hilltops and have little surface water provision. For this reason, Siena, a Tuscan city at the top of two watersheds dug into its hillsides to find water¹.

With increased demand, redundancy was the goal; authorities desired some slack, and therefore, some resilience in their systems to cope with seasonal or extraordinary disruptions. Thus, if one water source was subject to periodic or seasonal drought,

¹ Michael Kucher, The Water Supply System of Siena Italy, The medieval roots of the modern networked city (New York: Routledge, 2005), 4.

another was added that could withstand the drought or supply needed water during the shortage. This might mean the construction of aqueducts over long distances, or the operation of a combination of privately-owned wells and a publicly-owned canal-fountain system. All of this effort, the creation of infrastructure, the provision of public facilities and ultimately, private access, was to ensure that residents of the city were shielded against the natural dynamic variations of their ecological context. This redundant infrastructure created an urban landscape, a spatial morphology, as the consequence of social negotiations. Every social negotiation, whether primarily of conflict or cooperation, around urban water and sanitation infrastructure, would ultimately affect the material space of the city, and the daily lives of every resident.

One of the important points about the extensive research into Italian cities is how it could apply to this research regarding Piacenza. The ecological contexts are sometimes quite different and the solutions to find and furnish water to the cities equally varied. But the social evolution of the administrations that maintained the water supply and kept an urban settlement clean apply to many Italian cities at the time, including Piacenza. Michael Kucher points out that due to the *Via Francigena*, the main pilgrim route to Rome, cities shared knowledge and expertise with one another from the late Medieval period². The connection of many of the cities in this section to one another would have continued in the Visconti period in the 14th and 15th centuries as most of those in this discussion fell under Visconti and then Sforza rule. Cipolla shows how cities shared information on plagues and sicknesses so that they could protect their populations³. Likewise Italian cities used their connections to share technological innovation and expertise as well as legal and political developments around the management of water resources.

² Ibid., 3 and 7.

³ Carlo Cipolla, Miasmas and disease, public health and the environment in the pre-industrial age, (London: Yale University Press, 1992), 8.

3.1.1 Central Italy-Tuscany

Siena

Siena, located south of Florence in the Tuscan hills, has attracted several researchers. One reason is the technological innovation found there in the Medieval water system. Another is the multiple methods of water collection and distribution used within an ecological situation that created limits to the growth of the city and the urban population.

According to Kucher, the hilltop city of Siena straddles two different watersheds, and as a consequence, this leaves the city with very little water⁴. It might seem strange to locate a city in such an inhospitable environment but Kucher places the development of the city during the Middle Ages precisely as a place of hospitality for pilgrims along the *Via Francigena*⁵. Siena is somewhat special in its geomorphology as it is located on three hills. These hills acted as large filters and containment sites for rainfall. From the 12th century, the city progressively tunnelled into the hillsides, in a qanat-type system, and set up a scheme of gravity-fed public fountains⁶. With seasonal droughts in July and August, eventually the water infrastructure was inadequate. Siena was unable to industrialize as other cities in Italy did in the late Middle Ages and Early Modern period because the best mill sites were outside the city walls further down in the valleys. The lack of further water resources kept the city at or below the peak population of 50,000 in the early 14th century, at what in essence was the carrying capacity of its water resources⁷. Kucher notes that due to the method of obtaining water, the fountains in Siena were largely hidden in the valleys between the hills, which constituted the urban space. To make up for the seasonal variation in availability, residents of the city also collected and stored rainwater and designed fountain systems that utilized water in a hierarchy of uses from potable to polluted.

⁴ Kucher, *The Water Supply System of Siena Italy*, 43.

⁵ *Ibid.*, 3.

⁶ A qanat system uses horizontal tunnels into hills in order to access water and then transport it to fountains or cisterns where the population can access the water.

⁷ Kucher, *The Water Supply System of Siena Italy*, 4. The population was around 50,000 by the 1320's. The plague of 1348 is estimated to have killed between 50 and 75% of the urban population which would have greatly affected the availability of water per individual. 10.

From the *Biccherna*, the account books for the city from 1126 to 1555, Kucher was able to reconstruct the water infrastructure for Siena from the second quarter of the 13th century. The Sieneese used four methods to obtain water: rainwater collection in cisterns, wells, excavated springs with fountains, and an aqueduct, in an unusually complex system. While springs were exploited very early, it is the development into fountain complexes that brought them into full use. Kucher remarks that by 1300, the city walls had been expanded to encompass most of the fountains⁸.

This careful management of the Siena water system evolved as the city confronted ongoing water shortages. As the city reached its peak population in the early 14th century the administrators augmented the hillside springs with wells and rainwater collection in cisterns. But even with those methods Kucher calculates that the average amount of water available for all uses inside the city was about 12 litres/day/capita⁹.

Late Medieval cities were keen to expand industrially as this enhanced prosperity. But this kind of growth could also lead to a crisis, as many industries demanded a supply of water and often created waste and pollutants that then had to be removed or cleaned up. Kucher examined the legal statutes in Siena from the 13th century and found that the city was concerned primarily about the purity of its limited water supply. The hierarchy of water usage, from purest to most polluting, is embodied in the design of the fountain complexes and reinforced in legislative mandates¹⁰. Kucher quotes a description of the fountain from a 1556 account as built with a number of basins, all with designated uses from potable, to animal use, laundry and finally for industrial purposes¹¹.

Municipal statutes from the 13th to the 16th centuries acted to limit conflict over resource usage. Statutes were enforced through the use of paid custodians for fountains, guards, and secret informers to detect polluters. Inspections were scheduled secretly so

⁸ *Ibid.*, 13.

⁹ *Ibid.*, 68.

¹⁰ The purest water was where the water entered the fountain or pool complex. Pools then fed one another in a descending order of purity of uses as they moved away from the pipe with the fresh water. It was a means of conservation through use of grey water.

¹¹ Kucher, *The Water Supply System of Siena Italy*, 64. Kucher quotes from the 1556 account :Memoria delli Bottini che sonno nella Citta de Siena e che entrano in esse e fontane che fanno, e prima’ published in Comini, *Rapporto*, 25-31.

that polluters would not have been alerted and attempt to evade responsibility. Inspectors who failed to do their job suffered monetary penalties¹². Kucher found the municipal statutes to be specific and concrete with the goals of allocation of a scarce resource, minimization of costs, reduction of conflict between users, and preservation of water purity. Municipal committees oversaw the location, design and construction of fountains in accordance with the regulations that governed the use of water¹³.

In her work on Siena, Roberta Mucciarelli focused on the provision of sanitation, especially in response to plagues and epidemics¹⁴. In the development of municipal knowledge and expertise about waste and sanitation, the *Gabella* (tax records) shows that refuse was commercialized. This allowed refuse to be collected, removed from the city, and used for fertilizer on the nearby fields¹⁵. Industries that polluted were zoned and closely watched for any violation of water purity¹⁶. In the social solutions applied to the issue of sanitation there was always the question of the boundary between public and private space and the scope of legal interventions¹⁷.

In day-to-day life, guilds, which were associations for trade and artisanal activities, employed their own administrative authority over their members and could dictate industrial processes and management of water. It was a serious offence, in cities like Siena, for an industry to pollute the water. Kucher shows that the guilds often owned and managed their own water supply at public fountains and used means similar to the city's urban administration to deal with infractions, such as written statutes, inspections,

¹² Michael Kucher, "The Use of Water and its Regulation in Medieval Siena" *Journal of Urban History* 31 (2005): 510.

¹³ Kucher bases his work on the *Costituto, Statuti* and the *Statuto dei Viari*. These are published lists of regulations and statutes governing public works and city life that make up a sort of legal agreement governing life together.

¹⁴ Roberta Mucciarelli, 'Igiene, salute e pubblico decoro nel medioevo' in *Vergognosa immunditia, Igiene pubblica e privata Siena dal medioevo all'eta contemporanea*, eds. Roberta Mucciarelli, Laura Vigni, Donatella Fabbri, (Siena: Sienambiente, Nuova immagine 2000), 23-24. Some of the archives used for her chapter are the *Statuto dei Viari* (ASS), and the *Costituto del Comune di Siena* (ASS) from the 13th c.

¹⁵ *Ibid.*, 44.

¹⁶ *Ibid.*, 58-60. Archival sources used were the *Statuti, Consiglio Generale and Regolatori*.

¹⁷ *Ibid.*, 79.

informers and fines¹⁸. Polluting industries, such as butchering, were further regulated so they could not locate too close to the fountains, or obstruct proper use of them¹⁹. In a city that lacked sufficient resources, this kind of cooperative conservation to maintain the purity of the drinking water was critical to communal well-being.

In his book Kucher comments that the city sought to bolster the public infrastructure with a call to citizens to build their own cisterns and wells, and to collect rainwater from their roofs. The city encouraged the private construction with financial incentives for systems built in ways that served the wider population. Meanwhile sanitation of human waste continued to be a public problem with edicts in the 17th century that attempted to spur the development of private facilities.

In her research on Siena, Laura Vigni examined the *Regolatori* to see how laws shifted over time. The regulations included street maintenance and management. She found that in the 17th century there was a shift to include a concern about private household management of pollutants, sewage, and odours. To be a good neighbour meant not to risk others' health with bad smells. From the city records of the *Regolatori* and *Preunitario*²⁰, she found that in 1623 public urination below a household window was prohibited. And in 1637, a new proscription was instituted against the disposal of garbage out of windows²¹. This new interest in public cleanliness spurred on the development of private facilities that dealt with sewage and garbage. Further edicts in 1721 increased the rules

¹⁸ Kucher, *The Water System of Siena Italy*, 86 cites examples of guild statutes from the *Statuto dell'Arte di Carnajuoli di Siena* (butchers), the *Statuto dell'Arte di Lana de Siena* (woolworkers), and the *Arte di Cuoiai e Calzolari* (leatherworkers and shoemakers).

¹⁹ Muccarelli, "Igiene, salute e pubblico decoro," 56. Muccarelli obtains specific information on the evolution of legislation of fountain use from the ASS, *Costituito del Comune di Siena* (1262) and *Statuti* (1288-1293).

²⁰ The *Preunitario* is a collection of municipal records, found in the Archivio del Comune di Siena (ACS), which cover the period from 1524-1865.

²¹ Laura Vigni, "Problemi di igiene a Siena fra seicento e novecento", *Vergognosa immunditia: igiene pubblica e privata a Siena dal Medioevo all'età contemporanea*, eds. Roberta Mucciarelli, Laura Vigni, Donatella Fabbri, (Siena: Sienambiente, Nuova immagine 2000), 93-95, 126 from the *Regolatori*. Further evolution of the rules are noted on page 95 with a bando (a decree) in 1603 that attempted to clean up the city during an economic slump, and new regulations that concerned street refuse in 1698. These were found in the *Balia* (municipal council proceedings). Page 126 notes the 1623 decree against public urination and later the 1637 prohibition on tossing garbage from windows.

about cleanliness. Despite the city's efforts Vigni is able to find travellers' accounts from the 17th century that speak of the lack of drainage or an effective sewage system²².

3.1.2 Northern Italy – Veneto

Venice

Venice appears to be a special case due to its location as several linked islands in a saltwater lagoon. However, its water problems were really not that different from those of other cities. When it came to fresh water supplies, Venice existed in a desert, it had to find methods to supply fresh, non-brackish water to its large and increasing population which stood at over 150,00 in the early 16th century with a decline to 138,000 by 1700²³. Rainfall collection became an important answer to the population needs but in times of low rainfall Venice suffered from chronic water shortages²⁴. Elizabeth Crouzet-Pavan comments on the ambivalent relationship Venice had to the sea. By the 14th century problems began to be seen in the health of the lagoon with sedimentation and silting of the crucial ship channels through the outer islands. The Venetians feared for the life of the lagoon and, by extension, for the life of the city. Life became one of daily struggle against the forces in the lagoon that could destroy the city²⁵.

Attention focused on the issue of river sediments that entered the lagoon from the mainland. As early as the 14th century, but extending over several centuries, the Venetians engaged in large-scale canal construction and dredging projects, on the mainland, designed to minimize the threat of silting in the lagoon which impeded the tidal flows. The health and life of the city depended upon a constant cleansing by the tides to remove the wastes deposited in the canals. Without this the city would become an unsanitary and unhealthy place to live. And it would stink. Anything that impinged upon the tidal flow had to be combated and that included the rivers that flowed into the lagoon

²² Ibid.125. note 1, cites Voyage en Italie, in A. Brilli, Viaggiatori stranieri, cit., p. 167.

²³ Gregory Hanlon, Early Modern Italy, 1550-1800, Three seasons in European History (London: MacMillan Press, 2000), 4.

²⁴ For more on Venice and of similar systems in Spain see:
<<http://systemsthatseep.wordpress.com/>>.

²⁵ Elizabeth Crouzet-Pavan, Venice Triumphant, The Horizons of a Myth, trans. Lydia G. Cochrane, (Baltimore: Johns Hopkins University Press, 2002), 49-50.

and brought the silt and sedimentation. Projects were begun to divert rivers both to the north and south of the lagoon. Some of these projects such as the one involving the Brenta River would go on for centuries²⁶.

To provide fresh, potable water the city was oriented around neighbourhood *campi* or small plazas. These local squares usually contained one or more wells, fed by rainwater collection, for use by local residents. The plaza itself was designed as a large water tank, lined with clay and filled with sand and gravel. The plaza was then sloped and paved. The local residents accessed the stored and filtered water through the central well. Too frequently, rainfall collection was inadequate to the needs of the inhabitants. At those times, often in late summer, the city brought in barges with water from the mainland to sell to thirsty residents. By the 16th century Venice became a very densely populated city and was sustainable only because the movement of goods in and out was paid for by someone one way or another. The lagoon waters were both a conduit and a barrier that the city had to deal with in both directions²⁷.

The advent of an increasingly large population meant that the state had to take control of much of the space of the city and the lagoon. With that many people life had to be coordinated by a greater, more regional authority. The state created the *Savi alle Acque* in 1501. It was responsible for the edges of the lagoon, the rubbish along the canals and the hard and soft edges that met the water. By 1505 the *Savi* had been left behind and the *Collegio Solenne alle Acque* took its place, made up of the highest-ranking state officers²⁸. While patricians and special expert engineers managed the water, Venice also made use of local oral traditions and the knowledge of those who worked on the water of the lagoon, the sailors and fishermen.

On the mainland the Venetian approach to water management was similar to that of other cities in northern Italy. In the first two chapters of his book Ciriaco covers the

²⁶ Salvatore Ciriaco, Building on Water, Venice, Holland and the Construction of the European Landscape in Early Modern Times, trans. Jeremy Scott (New York: Berghahn Books, 2006), chapter 3.

²⁷ Crouzet-Pavan, Venice Triumphant, chapter 1 for environment and early history and chapter 2 for military and commercial outreach.

²⁸ Ciriaco, Building on Water, 102.

drive to increase agriculture in the Veneto in order to better service the urban population on the island city during the 16th and 17th centuries. Typically water concessions were sold for the Alpine foothills, while irrigation and land reclamation projects were expanded. He documents the ongoing conflict over different water uses, especially between the use of water for agriculture and water for energy to drive mills²⁹. This kind of conflict existed in other parts of northern Italy and was prominent in Piacenza.

3.1.3 Northern Italy- Lombardy

Milan

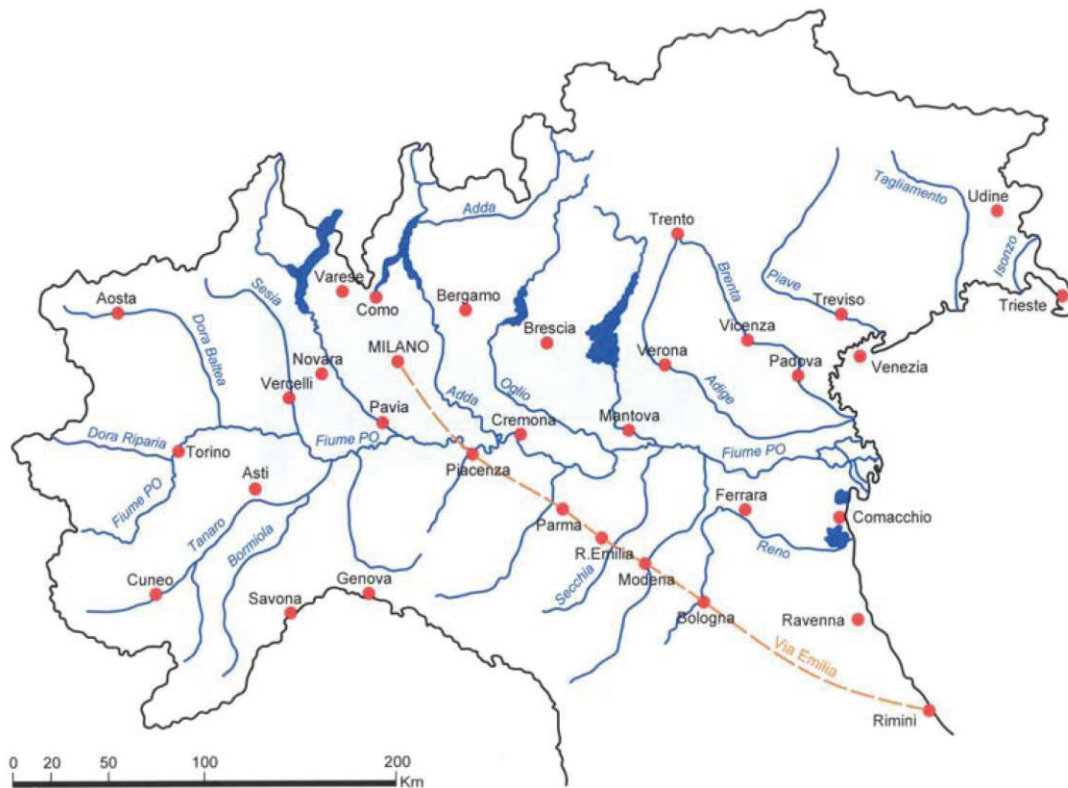


Figure 3-1: Map of northern Italy and the watershed for the Po River. From Giuliana Fantoni, “Water Management in Milan and Lombardy in medieval times: an outline” in *Journal of Water and Land Development*, #12, (2008): 17.

²⁹ *Ibid.*, chapters 1 and 2.

Milan has always been the pre-eminent industrial city in Italy, with a population of 124,000 by 1700, and it has historically commanded a large area beyond the city itself³⁰. Milan was always considered a prize as other nations such as France and Spain competed over portions of Italy. From Milan were launched attempts to conquer northern Italy and beyond. Milan is located on the Alpine side of the Po River on the northern edges of the Po River Valley. According to Fantoni it is an area with numerous springs and impermeable subsoil which actually creates problems with water drainage. From the time of the Romans, the solution was irrigation and land reclamation. While several rivers contribute to the water system in and around the city, by the Middle Ages, the Lambro, with its constant and sizeable flow became the hub of a network of canals and ditches designed to maximize irrigation and water energy³¹.

Like other cities in the region, beginning in the 14th century, Milan sought to maximize its urban water resources with new canals. These canals circled the city and acted as a defensive barrier, provided irrigation for urban vegetable gardens, and enhanced sanitation³². Begun in the 12th century the Great Canal, the Naviglio Grande, was a navigable canal that came from the Ticino River. It provided irrigation, energy for mills, and a means of travel³³. Milan continued to create canals and extend the connections to the northern Italian countryside as a means to enhance agriculture production into the 16th century³⁴.

In her book, Fantoni traces the development of both environmental law and water infrastructure in the city of Milan. Fantoni makes use of wills, testaments, and dowry documents to show that there was a move to private, domestic facilities, as the city

³⁰ Hanlon, Early Modern Italy, 2. See also Richard Lachmann, Capitalists in Spite of Themselves: Elite Conflict and Economic Transitions (UK: Oxford University Press, 2002) 51-52. According to Lachmann, Milan had the following population figures: in 1320 – 75,000; in 1500-89,000; in 1600-107,000, and in 1700-113,000. Before the plague in the 14th century Milan, along with Venice and Florence were the top three commercial cities in Europe. Unlike Venice which had a population decline of 5% between 1600 and 1700, Milan had a population increase of 6%.

³¹ Giuliana Fantoni, “Water Management in Milan and Lombardy in medieval times: an outline”, Journal of Water and Land Development, (#12, 2008:15-25): 16.

³² Ibid., 19.

³³ Ibid., 20.

³⁴ Ibid., 22.

enacted more stringent legal requirements. In 1455, for example, a decree required that private individuals build storage cisterns for their sewage³⁵. Over time industries were required to obtain licenses if they polluted, as shown in the *Registri, gride, and statutes*. Industries were grouped together spatially to limit the extent of the pollution. Increased demand resulted in increased administration over the resource of water and sanitation in Milan.

Milan also had to deal with scarcity and sought to increase redundancy in the system through new infrastructure. Initially the city built its potable water system in the Middle Ages on public and private wells. Milan encountered water scarcity in the 11th century with an insufficient number of wells and public access to potable water³⁶. Water conflicts continued as demonstrated in church records that describe clashes over water supply during the building of the central plaza³⁷. As the city grew, the urban administration took on increased control of the water supply and acted to create new water sources through canals and fountains. At the same time, the urban management felt financially constrained and encouraged private investment in storage cisterns for sewage. In time, the provision of water and sanitation was seen as essential to the stability of the city. This caused much negotiation for power over the resource administration between the larger state and the city during the era of the Visconti dukes³⁸.

Resource competition entails management through legislation and Fantoni found statutes from the 14th century which, for example, detailed how close a fountain could be situated to a public river. It was required to be a distance of 10.44m away from the bank. The concerns, according to Fantoni, were to protect the purity of the river water and the structure of its banks, and failure to do so resulted in a fine³⁹. Fantoni mentions the

³⁵ Giuliana Fantoni, *L'acqua a Milano, Uso e gestione nel basso medioevo (1385-1535)*, (Bologna: Cappelli Editore, 1990), 111.

³⁶ *Ibid.*, 101.

³⁷ *Ibid.*, 103.

³⁸ *Ibid.*, 124 – 128.

³⁹ *Ibid.*, 104, note 32, ASCM, *Statuta*.

problem of sewage leaks into the potable water and the contamination that resulted. The city also used a system of sewage canals to process polluted water⁴⁰.

Through the study of the *Indices straturum et aquarum civitatis Mediolani et ducatus*, Fantoni was able to compile a list of the men who had authority over water and sanitation from 1385 to 1483 for the city and the region. She found that there were several family dynasties involved in water administration in Milan. Subordinate to the professionals were the people who actually did the labour to create and maintain the urban infrastructure for water and sanitation. Fantoni mentions that when the city of Milan required residents to construct cisterns for waste storage in the 15th century, a guild, *i maestri delle cisterne e dei pozzi*, formed to build the wells and cisterns⁴¹.

In the 15th century the city of Milan experienced financial difficulties, which pushed toward the development of private water facilities. Through the records of endowments and testaments Fantoni found an increase in private infrastructure which included institutional facilities for water and sanitation. She notes the *Ospedale* in Florence that had its own water supply by mid-15th century. Likewise the *Ospedale Maggiore*, begun in 1459 in Milan, had its own water canal. The hospital was built with a system of underground canals to service its needs⁴².

It is clear from Fantoni's research that the water system in Milan was built up from the Middle Ages, and was organized to maximize the various uses of water for energy, industry, sanitation, domestic uses, and irrigation. She found that under Visconti/Sforza rule, during the Renaissance, the administrative system continued to be enforced though it moved further to a mix of private and public facilities. Piacenza came under Visconti rule in 1313, with a system of urban and rural canals already in place. This period was not part of the archival research for this thesis and it remains yet to be examined in detail.

⁴⁰ *Ibid.*, 107-110.

⁴¹ *Ibid.*, 111. By 1491 the workers who built cisterns and wells were powerful enough to constitute their own organization separate from those who built walls. A worker could have the position of *maestri delle cisterne e dei pozzi* (master of cisterns and wells) as distinct from the *muratori*, masons.

⁴² *Ibid.*, 113.

However, it would be reasonable to assume that Visconti dukes recognized the value of the Piacentini canals and ensured that they were maintained.

Bergamo

Zupko and Laures looked at the environmental law found in several north Italian cities including Spoleto, Ferrara, Verona and Bergamo. Bergamo is located northeast of Milan in the foothills of the Alps and had a population of around 20,000 in 1700⁴³. The authors examined a body of law, the *Statuta magnificae civitatis Bergomi*, finally codified in 1727, that contains edicts and decisions that govern water infrastructure from the early 13th century. It covered how polluting industries were zoned, the sanitation of the city, the responsibility of homeowners in terms of domestic sanitation needs, and the maintenance of the water supply and waterways. It included discussions of property issues, regulations to maintain water purity, and the penalties for the pollution of fountains.

Bergamo also legislated substances that polluted the city and its water. Zupko and Laures note a statute from the 1727 collection that restricted where one could butcher an animal and applied a fine to those who broke the law. The intent of the ruling was to limit the putrid and disgusting waste that came from the activity of butchering⁴⁴. Without refrigeration, butchering was of necessity carried out near or within urban settlements but the city sought to regulate and contain the mess of organic waste created by the market. Apart from containment there was also action to ensure that such activities took place near running water, the better to remove it from Bergamo and send it downstream. When possible, the cost of containment or removal of waste from the city was passed onto residents and businesses. Home owners were required to support the costs of cleaning their sewage cisterns. Bergamo established a user-pay system with roads and water infrastructure assigned to local neighbourhoods for management, oversight, and repairs.

⁴³ Hanlon, Early Modern Italy, 2.

⁴⁴ Ronald Zupko, and Robert Laures, Straws in the Wind, Medieval Urban Environmental Law, the case of northern Italy. (Colorado: Westview Press, 1996), 100.

3.1.4 Northern Italy - Emilia-Romagna

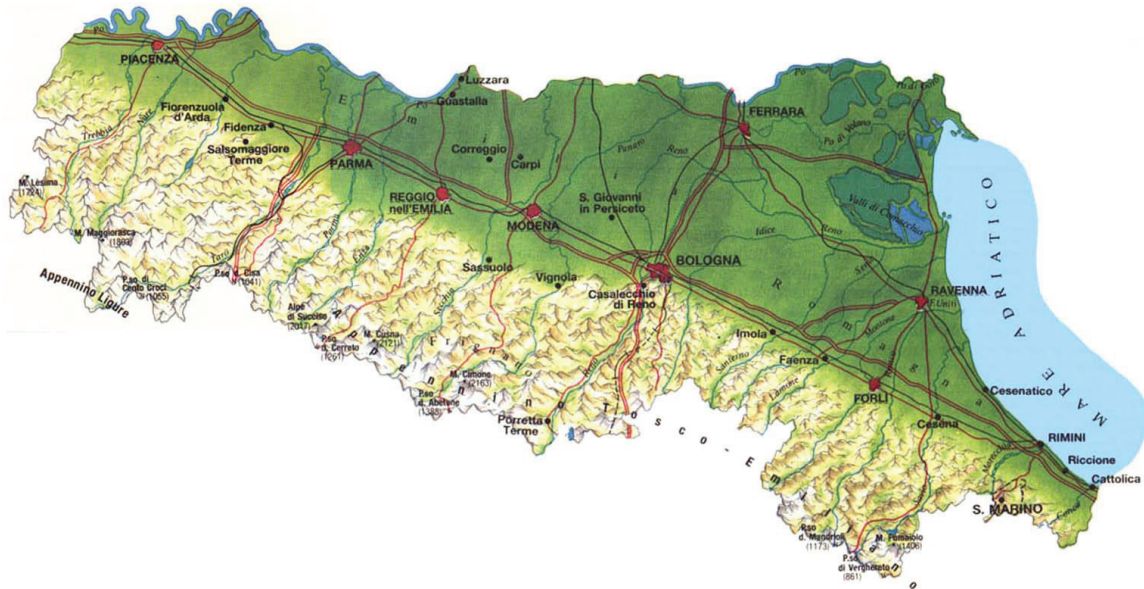


Figure 3-2: Topographical map of Emilia-Romagna region of Italy. Source:

<<http://www.worldmapsinfo.com/map-of-emiliaromagna-italy-europe.html>>

Bologna

Located in the south-eastern part of the Po River Valley, Bologna is a good illustration of how the management of water infrastructure affected the space of the city. Like Piacenza, it is located south of the Po River and was dependent upon torrents from the Apennine Mountains for its water supply. Bologna was the pre-eminent city of the region in a highly urbanized strip that ran along the Via Emilia to Piacenza at the Po River and then onto Milan. In 1500 Bologna had a population of 55,000 which rose to 63,000 by 1700⁴⁵.

Marco Poli started his study in the 12th century, when the city sought to increase services and industry with a canal for local mills. This evolved into a dense network of canals through the city. With brick as the primary material, small channels were eventually built off of the larger canals to facilitate domestic use through concessions sold to homeowners. In the 15th century, the goal shifted to beautification of the city and

⁴⁵ Lachmann, *Capitalists in Spite of Themselves*, 51.

to meet the demands of urban nobles with their larger domestic compounds. By the 16th century, there was a move to cover channels and water was piped into the bathrooms of new palaces. Water was systematically added to parts of Bologna yet some neighbourhoods still suffered scarcity. In the 17th century even as infrastructure evolved and increased, the goal shifted to cover the canals, and bury the channels and sewers to maximise street circulation and transportation. As the city developed, so too did the infrastructure, especially for the wealthy, from visible canals and sewers to those that were invisible⁴⁶. Today there is an effort to uncover at least one of the historic Bologna canals, now that they no longer function as sewers.

Ferrara

Zupko and Laures reference regulations in other northern Italian cities beyond Bergamo. In Ferrara, a city located on the south side of the Po River in Emilia Romagna near the Po delta, with a population of 33,000 in 1601⁴⁷, there was a concern to keep pollutants out of the Po River. Legislation governed industrial uses and human waste as it flowed to the river. Authorities were appointed to oversee the town's ditches and sewers in each quarter of the city, to ensure that citizens kept them cleaned out. Verona too, in the Veneto on the north side of the Po, had similar statutes that governed the use of the rivers Adige and Fiumicello, and the lesser tributaries. The intent of the statutes was to keep river water clean, clear of sewage and industrial pollution, and free flowing. In the case of the Adige no one was allowed to throw in trash or deposit polluting waste during the day, though it was considered legal to do it at night⁴⁸.

⁴⁶ Marco Poli, 'Il canale fiaccacollo e il fosse dei Pellacani', in Le acque a Bologna, ed. Marco Poli, (Bologna: Editrice Compositori, 2005), 114.

⁴⁷ Charles, G. Nauert, Historical Dictionary of the Renaissance, 2004.

<<http://renaissance.academic.ru/197/Ferrara>> 2004.

⁴⁸ Zupko, and Laures, Straws in the Wind, 37 and 65.

Parma

Parma, long famous for ham, salami, and cheese, is located 65 km southeast of Piacenza in the Po River Valley. Like Piacenza it sits on flat land with the Apennine Mountains to the south and west. However, unlike Piacenza, it is not sited on the Po River but sits about 25 or 30 km away. The city is bisected by shallow and fluctuating Torrente Parma which eventually flows to the Po River, and was connected to the Po River by a canal. Founded by the Romans the landscape was initially shaped through the early efforts of *centuriazione*, the imposition of a system of irrigation canals on the countryside through the construction of levees, banks and diversion channels, and *bonification*, the drainage of wetlands. This work built on construction already completed by the Etruscans prior to Roman colonization⁴⁹.

A change in government could act as an impetus to new investment in water infrastructure. With the advent of the Farnese dukes in the 16th century the city increased substantially in population as people chose to be located near to the court, the water infrastructure then needed to be upgraded to keep up with the new demands. During the 16th century the city had 20,000 to 25,000 people and grew to 33,000 by the early 17th century before the last plague in 1630. The population then dropped to 19,000 in 1650 before rising to 35,000 in the 18th century⁵⁰. The city already had two canals from the Middle Ages with the Fonte Valoria constructed in 1403 by the urban government. But clearly the city lacked sufficient supplies as construction of water infrastructure exploded under the Farnese. Giancarlo Gonizzi presents a chronological account of a new aqueduct along with new fountains in the city. There was also an increase in the number

⁴⁹ Michela Rossi, Strade d'acqua, navigli, canali e manufatti idraulici nel Parmense: dal rilievo del territorio al disegni del paesaggio. (Parma: Presentazione di Paolo Giandebiaggi. Universita degli studi di Parma, facolta di architettura. R.R.R. C3, Mattioli 1885, 2004), 40-41.

⁵⁰ Paul F. Grendler, "Parma, Europe, 1450 to 1789", Encyclopedia of the Early Modern World, 2004. <<http://www.encyclopedia.com>>.

of private fountains to serve the nobility, who built residences in the city to be closer to the Farnese court⁵¹.

The aqueduct, begun in 1570, was a public project intended to provide potable water to the city. The project consisted of two terracotta pipes with variable diameters of no more than 15 cm that ran for 7.5 kilometres and came from the area known as Villa Malandriana, southeast of the city on the plain⁵². This means the water must have come from the Enza River to the south of the city rather than the Taro which ran north of the city though Gonizzi never specifies the actual source. One pipe served the ducal residence and the other was for public consumption. Once in the city, the water was diverted through smaller lead pipes to fountains in the major public square and in a smaller square. The new infrastructure more than satisfied urban needs, and provided up to 42 litres/day/person by Gonizzi's estimates. The new water infrastructure was also seen as a way to make money with concessions for private water service⁵³. More public and private water infrastructure followed during the Farnese reign, some built by the city and some by the Farnese state. Yet by 1655, the infrastructure and water supply was found to be insufficient for the needs of all citizens though Gonizzi does not explain why⁵⁴.

The outstanding difference between Parma and Piacenza, both cities under the authority of the Farnese dukes, is the presence of fountains. Both cities sought to augment the use of the local natural water supplies with canals for irrigation and to drive mills. In addition Parma created an infrastructure of underground pipes in the countryside to supply public urban fountains, something not seen in Piacenza at all. Whether this was a response to the city of Parma's own particular ecological context and topography or due to the presence of the Farnese court is unclear.

⁵¹ Giancarlo Gonizzi, La città delle acque, Approvvigionamento idrico e fontane a Parma dall'epoca romana ai nostri giorni (Parma: PPS Editrice, 1999). The author cites archival sources such as the Notarile acts, Ordinances, Statutes, and the *Cancelliere*.

⁵² Ibid., 33.

⁵³ Ibid., 34.

⁵⁴ Ibid., 35.

3.1.5 Summary

Water provision and sanitation through use of water is an inevitable theme in dense settlements. The issue of resource supply and reduction and removal of all kinds of pollutants and waste has to be solved by the urban leaders and administrators. Dependent upon local conditions cities had the same goals, to contain or hold water supplies long enough for use in resource-scarce times and to divert supplies that otherwise would have gone elsewhere. To this end they employed a variety of means that included canals and aqueducts, wells, hillside tunnels, and rainwater collections and storage. Once the water was collected, city officials had to regulate its usage in order to ensure supplies and to maintain the purity of the water. For this, over a period of several hundred years, legislation was developed and evolved to meet local needs. These social agreements determined much of the space of the city and the lives of residents.

Italy follows this kind of development overall. Cities, initially as Roman colonies, benefitted from ancient expertise in water management and a commitment to infrastructure in the settlements and surrounding territories. But the loss of the empire also frequently entailed the destruction of the infrastructure. More peaceful times and population increases in Europe meant that Italian cities had to rediscover the infrastructure, the management techniques, and the administrative means to provide water to urban residents, mills and other industrial uses, and the countryside where the food supply was produced. Over time infrastructure was renewed, repaired and extended to provide for the increasing urban needs. And over time, especially after the appearance of the plague in 1348, sanitation was understood to be increasingly significant, with time and energy invested in it.

Piacenza followed this form of development through the upheavals of plagues, famines, wars and political shifts. Through it all, the urban leaders made a way to manage the water infrastructure. The Italians were skilled at sharing information from one city to another as they learned from experience and explored and innovated new ways to collect and deliver water to their cities. As the cities grew the authorities sought the knowledge

and expertise they needed through engineers employed by the urban governments. As Ciriaco demonstrates, the Italians were the water experts up to the 16th century when the Netherlands began to lead the way⁵⁵. The Italians created webs of knowledge between their cities, in some cases to manage plague outbreaks, and in other cases to share expertise about water and sanitation⁵⁶. Piacenza, located at an important crossroads and at a main crossing of the Po River, would have benefitted from all of this knowledge and sharing⁵⁷.

But most of the research done to date has focused on the management structures of the 14th to 16th centuries. While Gonizzi in Parma, provides information on the Early Modern period through a discussion of the Farnese improvements to the system, he fails to cover the administration of the infrastructure. And there has been little yet, on how the social and spatial interacted and influenced the shape of the cities. Piacenza offers an exciting glimpse into this Early Modern water management through the archive the *Congregazione sopra l'ornato*. This archive contains the communications between committee and urban inhabitants, the complaints, orders and decrees, bills for work done, tax lists, and engineer reports. It provides a comprehensive examination of how the city managed its water and sanitation systems during the Farnese years. Nothing like this has been examined to date for any of the northern Italian cities. The archive provides new details on how northern Italian cities met the water needs of their dense urban settlements and coped with the day-to-day, routine demands of the system.

⁵⁵ Ciriaco, Building on Water, this assertion is the thrust of the book.

⁵⁶ Carlo Cipolla, Public Health and the Medical Profession in the Renaissance, (Cambridge: Cambridge University Press, 1976), 48. Cipolla shows in his work that people were concerned about bad odours as a source of disease. This led authorities to focus their efforts, sometimes sporadically, on sanitation and cleanliness. However, the connections people made between unclean or polluted water and disease is unknown.

⁵⁷ The road to Milan from Piacenza crosses over the Po River where the river narrows. On the opposite bank a spit of land, often cut off by higher flows, extends into and narrows the river. Thus the way across can be shortened and staged across this area. Just downstream of this site the Po today splits into two arms around a small island. While the Po is a dynamic river, and has changed meandered over time Piacenza remained an important crossing place. Piacenza was the site of the first railway bridge in northern Italy in 1865.

3.2 RESEARCH DOCUMENTS

The core of this work is a compilation of documents that span two hundred years of the Farnese dynasty in Piacenza, Italy. The documents that form the basis of this research cover the management of the urban space and the administration of water and sanitation in the city from 1547-1736.

3.2.1 Archivio di Stato di Piacenza (ASPC)

Congregazione sopra l'ornato (CSO)

During his short rule the first Farnese duke, Pier Luigi, set up a committee to oversee the urban space in 1546. This committee governed throughout the reign of the Farnese dynasty.⁵⁸ The committee, the *Congregazione sopra l'ornato (CSO)* was charged with the maintenance of the urban space with an emphasis on its cleanliness and orderliness.⁵⁹ While the original name might imply that the committee was focused on building ornamentation this turns out to be untrue. In a detailed study of *buste 1-19*, out of the total of 25, there is little on actual building ornamentation, instead, the bulk of the committee's work was taken up with the management of the water supply and street sanitation after an early concentration on extension and development of the urban area along Strada Gambarà (today Stradone Farnese) which was to be a processional boulevard. Committee work from that time also included the concession of business licenses. This research focuses only on documents that involved water in some way, whether from the canals,

⁵⁸ This investigation is focused on the time period between 1547 with the establishment of the committee to 1736. In 1731 the Bourbon branch of the family took over the government. In 1736 the Austrians arrived to govern for 12 years. In 1748 Philip Bourbon-Parma became the head of state. Note that the word *busta* refers to the envelope or folder that holds the documents. *Buste* vary in size and the number of documents contained within.

⁵⁹ Over the course of 200 years the committee underwent a couple of name changes and at times documents reference it in different ways during the same years. Most generally the committee was designated as *Congregazione sopra l'ornato della Politica* or *della Polizia*.

street drainage or sanitation. It is these documents that have formed the foundation of this research⁶⁰.

It is outside the scope of this research to account for variations in the archives that may have resulted from shifts in record keeping over time, or from external events that destroyed documents, although such things are always possible in terms of the contents found in the collection today. Such events can skew the research outcomes of the examination of the archive. The CSO archive consists of a variety of documents that may have been initially created and organized in separate collections located in different buildings within the city. Over time, shifts in organization and record keeping regimes may have changed the types of documents available within the record. This research is an examination of the archival collection as it stands today however the documents were initially created, stored and organized.

The archival collection of the CSO consists of a number of types of documents that illustrate the work of the committee. Within this archive is a record that details the relationship between the people of the city and those who oversaw the water system. The archive clarifies the role of the nobles who sat on the committee, the millers and others who oversaw the maintenance of the infrastructure, and the everyday people who submitted their complaints and comments about the effectiveness of the committee and the state of the system.

The committee acted as a combination of a modern day Planning Department, Building Department, Works Department, and Committee of Adjustment all in one for it managed the urban infrastructure both above and below ground⁶¹. It initiated any

⁶⁰ A total count of documents in the 19 *buste* was never taken. An informal observation is that water issues, of one type or another, make up at least 60% and possibly more of the documents and hence water issues, broadly defined, took up the majority of the committee's time and attention. The attention to water issues varied from year to year, however, around 3,000 records connected to water and its infrastructure were found in *buste 1-19*.

⁶¹ Cities today generally have separate departments for the work done by the CSO, there frequently is a Planning Department which oversees the planning for the whole city, and a Building Department which issues permits and licenses to build as well as conduct inspections. Another separate department, the Works Department, manages urban

extensions or adjustments to the urban fabric, did assessments of the material condition of the infrastructure and ensured repairs when needed. Detailed instructions for new construction or repairs could be issued to insure the use of correct materials and an outcome with right dimensions. When needed, the committee could tax selected groups and individuals to finance the work, new or repair, on waterways and roads. It could issue licenses to private citizens and consortia to build bridges, private and collective sanitation cisterns, or open a business. The committee had the power to fine those who did not comply with municipal laws and it would pursue civil or criminal proceedings as needed. This small group of nobles, entrusted as urban leaders, was charged with the task of ensuring that the city functioned efficiently and effectively, so businesses could prosper and the duke's subjects would be happy with and healthy in their living conditions.

Acque della Trebbia e di altri torrenti e rivi – urban and exurban (AT)

Additional archives used in this research include part of the collection *Acque della Trebbia*, a group of documents that cover the administration of water from the River Trebbia for agricultural as well as urban uses. The collection is divided into two general areas, the *acque e rivi extraurbani*, that is, canals outside of the city, and *acque e rivi urbani*, the channels inside the city walls. Many of the types of documents are the same and in fact many documents in the *rivi urbani* collection are from the CSO. The *rivi extraurbani* collection covers the management of rural and agricultural canals and is focused on the agricultural *consorti* or societies who shared each irrigation waterway. For the purposes of this research only a few of the folders available in this collection were accessed which concentrated on the urban segment of the canals. This archival set is organized by canal name. In this research the following files were used:

Busta 2, Rivo San Savino and Rivo Trebbiola,

Busta 3, primarily Rivo San Siro,

Busta 6, Rivo San Agostino,

infrastructure such as roads and sewers. What is known in some cities as the Committee of Adjustment, is the place where citizens appeal Planning and Building Department decisions. These committees frequently include regular citizens as members.

Busta 7, Rivo Parente along with Rivo Santa Vittoria,

Busta 8, Rivo Meridiano,

Busta 12, the Beverora

The documents collected from this archive on urban canals have been collated with the CSO documents into a single unified Excel file for a more complete sense of the work of the CSO.

Collegio dei Mercanti di Piacenza (1524-1840) especially busta 6, statutes for millers (1279-XVIII)- (CM)

This material contains the written rules and regulations that governed the conduct of millers within the city and in the surrounding countryside. While mainly focused on those with mills along Trebbia-fed water channels, there are also references to the floating mills on the Po River.

Mappe, stampe e disegni – Piacenza (ASPC-M), Biblioteca Passerini-Landi (BPL-M), Parma (ASPr-M)

After the assassination of the first Farnese duke the family shifted its centre of power to the city of Parma and made it their capital city. That means that many records and archives from the Farnese period lay in the archives in the city of Parma rather than in Piacenza. Both archival collections contain numerous maps and drawings of the city of Piacenza and its canal system. Maps from the Archivio di Stato di Parma were also used in the study (ASPr-M), although due to a move of the archive into new facilities the records in Parma were not available during this research period. In addition to those archives is a collection located at the central city library for Piacenza, the *Biblioteca Passerini-Landi*. For this investigation such maps stand alone but also contribute to a comprehensive 17th century urban map done in AutoCAD.

Consiglio generale e anzianato, Provvigioni e riformagioni (CG-P)

The records used from this archive were those of the *convocati* of the CSO. This group contains what are essentially the minutes of the meetings with a record of attendance,

topics of discussion, and decisions made by the whole city council and its committees. Due to time constraints only a few particular years were examined in this record. The focus was on years around 1585 and the Farnese reform of the overall system at Colonna, the city's waterworks located near the Trebbia River.

3.2.2 Other sources used in this research

The water system of Piacenza was vital to the city and therefore attracted the attention of engineers, urban officials, and others. The *Archivio di Stato di Piacenza* (ASPC) and the *Biblioteca Passerini-Landi* (BPL) both contain studies by varied individuals that detail, explain and disagree over the water system. The intent of this research was to collect the documents that relate to the end of the Farnese dynasty and the change in government. There are records of the comments of the engineers who, after the Farnese era, examined the system and reported its failings and difficulties.

Photos: historical and contemporary

To supplement the maps and diagrams a number of photos were taken in the city with an attempt to locate some of the canal sites. This is difficult to do as all the canals have been covered over and rendered invisible. But clues can be found to canal locations by searching for sunken areas, areas of lower elevation, and areas that contain naturalized vegetation that indicates the location of water. Even the position of urban gardens today gives away the location of the old water channels. The canals were gravity-fed and it is right to assume that all of them must flow downhill from their entrance into the city walls on the south side of the city until their exit on the north near the Po River. Changes in elevation in streets that were known to carry water channels make it difficult to visualize the Early Modern urban landscape. Photos taken by the author and others of the contemporary urban space complement the maps and diagrams from the archives.

3.2.3 Organization of the materials

In total over 3,000 documents were copied or noted by hand, or occasionally with photocopies, for this research. Maps and diagrams were photographed. Together they comprise a wide range of material that includes the various types of communication used

by the CSO and others. To maintain some order in the accumulation of archival documents an indexing system was created. Each document was assigned a unique number that indicates the *busta*, where it was found, the folder in which it was located, and the order within the file or folder (ie. *busta# - folder# or date - order within folder*). The number that indicates the order in which the document was found pertains only to documents that have to do with water in some way and were deemed relevant to this research. The unique numbers do not cover all of the documents available in the CSO archive, simply the ones that were found to convey information about the water system, broadly defined. In footnotes, each document is identified with its unique number. Documents from the *Acqua di Trebbia* archive are further identified with the letter 'A' at the beginning of the document number.

In the archives the documents are only roughly in chronological order. *Buste 1-19* of the CSO essentially cover the years of the Farnese reign from 1545 to 1736 with some later extensions. The documents were recorded in the research according to type, date if possible, mention of any canals, types of infrastructure mentioned within the document, types of land use within the document, to whom the document was addressed, who it was from, and any clues about the location of the infrastructure under discussion. A majority of the documents were copied completely or in part.

Then the documents were organized by *buste*, by canal, and in chronological order in tables to facilitate analysis. The documents were put into chronological order and records from the AT were added into the overall CSO chronological list. The list is done by year within decades. The chronological table was especially important as *buste* and folders within them were not always in order; re-ordering the documents by date and decade enabled the analysis of sequential documents and re-occurring problems. Information in the documents about the location of canals or other aspects of the water and sanitation system in the city has been correlated with the information available in maps and diagrams. Information on the urban fabric, church, convent and monastery lands, garden sites, mill sites and canal locations from varied maps and documents has been brought into a single AutoCAD file built on a contemporary plan of the city. The CAD file has been used as the foundation for the research maps developed in this thesis with an attempt

to more precisely locate the canals and water system infrastructure in the city during the Farnese years.

3.3 ACTIONS AND MECHANISMS OF THE COMMITTEE

The committee members of the CSO had a number of mechanisms to promote cooperation between residents in the management of the water and sanitation systems in the city such that issued orders could be applied to individuals, groups and the whole city. It also had the means to deal with conflict, non-compliance, disputes, and to broker resolution of conflict, with an option to initiate court proceedings when needed. These instruments are made clear in the different types of documents found in the archival collection.

Because of the wide variety of document types initial analysis was done based on actions: that is, a document that was received or issued by the committee was considered to constitute a discrete action⁶². The results by decade vary widely from a low of 10 actions in the decade of 1571-80 to a high of 326 in 1621-30, a decade of famine and plague. This obviously raises the issue of missing documents. However the overall trend shown in more detailed analysis confirms an increase in documents and actions for the 17th century with lower numbers generally at the start and the end of the Farnese reign.

3.4 SUMMARY

Analysis of water utilities in northern Italy demonstrates that authorities sought to maximize the water available to a city through multiple collection and dispersion methods. While individual infrastructure decisions depended upon location and natural availability of water, when possible they tended to create redundant systems to provide during dry seasons or when natural water supplies fluctuated or failed. There are similarities and differences across the examined systems. The research documents from

⁶² Most of the committee documents are single-page in length, especially the numerous letters from residents. Committee-issued documents vary more widely and occasionally include booklets that recorded multiple meetings or actions. In this case generally a folder, such as a court case, counted as a single distinct action unless it clearly recorded numerous distinct actions, such as records of discreet and multiple fees and penalties. While there is an imprecision to the process further analysis supports the overall results.

the CSO will further highlight how the managers of the system in Piacenza made their decisions within their own ecological, political and social context.

CHAPTER 4: THE *CONGREGAZIONE SOPRA L'ORNATO* (CSO)

The archives of the *Congregazione sopra l'ornato* yielded a diverse collection of documents that show the relationship between the residents of the city and those who oversaw the infrastructure. This chapter explores the work of the CSO, illuminated by the documents and from the information found there, to construct and clarify an understanding of the urban infrastructure and its related land use issues.

4.1 THE WORK OF THE CSO

The CSO fulfilled several functions as overall managers of the urban fabric. These committee members made decisions about where businesses would be located in terms of licenses. They had oversight of all the urban infrastructure, roads, canals, underground conduits, cisterns, public wells, walkways, and bridges. They were a place where conflicts over building plans, and infrastructure could be appealed and resolved. And finally, with their authority to prosecute offenders they also assumed the powers of the magistrate, especially in regards to water usage in the urban area.

As noted in chapter 3, the following material is organized according to document types and actions taken by the committee or others. That is, a document was counted as an action even if it mentioned a single canal a number of times. A document that mentioned several canals or other types of infrastructure was counted as a single action with the additional information delineated in the chronological sequence of actions and events. Sometimes a situation involved several types of documents, each counted as a discrete action. The information collected is complex. Many documents cover multiple events or types of infrastructure. Sometimes a single situation is covered by different documents and document types that span many years. Descriptions of the infrastructure are often vague and lack enough detail to precisely locate and map the area under discussion. Thus the effort to organize and present the material required judgment calls. Alternative means of organizing the material may generate new insights into the committee's work.

4.1.1 Relation of CSO Documents to Larger Context

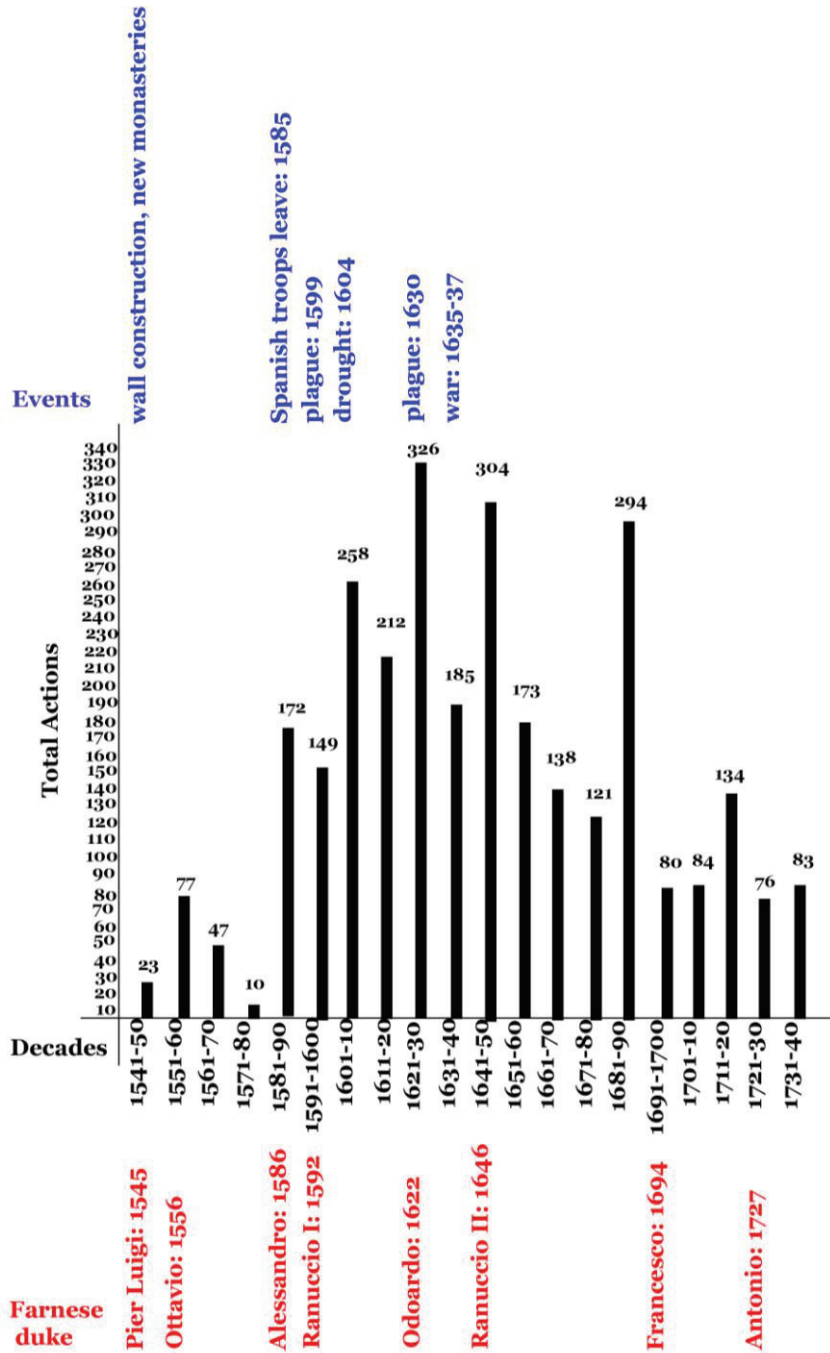


Figure 4-1: Chart of total committee actions by decade correlated with Farnese dukes and major events.

The CSO documents do not deal with what happened in the countryside. They reach to the city walls and only in a few instances go out into the fields that surrounded the city. The political history for the larger area is not directly accessible within the CSO archive. But does it show up in how the committee functioned? Is it possible to read the history of difficulties, conflicts and resolution in the documents of the CSO that cover the canals inside the city walls? Certainly the struggles around Landi control of the Trebbia system in the early Farnese years must have affected the city-dwellers at the bottom end of the system. Millers did complain about lack of water as Poli noted. But how did the CSO function within this atmosphere of continual conflict, especially when a member of the Landi family sat on the committee? The chart of all actions per decade shows that the committee certainly performed fewer actions in its early years. It appears to have expanded at the end of the 16th century and into the early 17th century. There is a significant rise in the number of actions during the decade that includes the 1585 reforms. A closer look at the early years yields this information:

Number of total actions with larger scale events noted

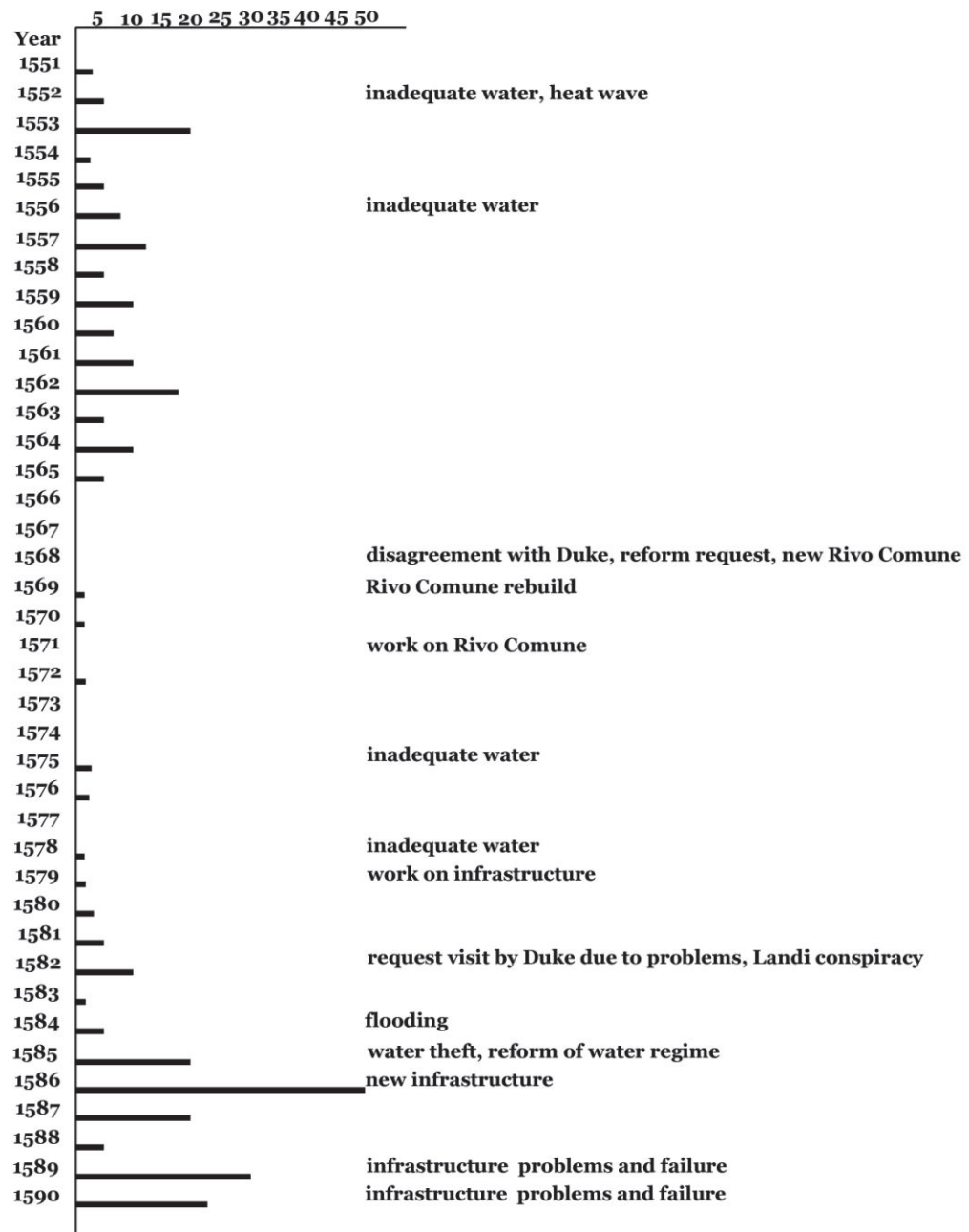


Figure 4-2: Number of total actions in relation to canals per year from 1551-1590, correlated with large scale political issues and events. Dates for major events extracted from Poli's account of the system. Valeria Poli, Le acque di Trebbia tra città e contado: norme, magistrature e uomini, dal 1420 al 1806. (Piacenza: Banca di Piacenza, 1995) 26-46.

Is it possible to correlate documents within the CSO with the political events that determined the water supply from the Trebbia River? It would seem logical that complaints about insufficient water supply should show up within the CSO records, but they do not. Poli depends, almost exclusively, on documents from the *Provvigioni*, frequently the minutes of meetings for the CSO¹. Yet there appears little correlation between the issues she finds there and any other documentation within the CSO archive. For example, Poli states that there were problems with insufficient water supply during a heat wave in July 1552. Surely there would be written complaints to the committee in such a situation, but there are none within the CSO. Dates that she subsequently notes where the city had to plead for sufficient water in the canals to supply urban mills are not supported by citizen letters in the committee archives. There were problems again in 1582 and in the CSO archives there is an intervention by the duke, in this case a general order about the kinds of work the committee should do that pertain to water management, how the water should be used within the city, and how the city was allowed to tax individuals to finance its work. It is not new material in its terms or the generality of its description. The focus of the committee that year, within the city, was often on Stradone Farnese and attempts to upgrade the street with drainage and paving.

Compared to the 17th century, this time period has far fewer documents, in one decade, 1571-80, a total of 10. There is an increase in the total number of documents processed within the committee after 1585, the year of the Farnese reform and when Poli claims power shifted to the city. The year after, 1586, shows a marked increase in committee communications. That is also the year when the city initiated new infrastructure in the countryside to increase the urban water supply. Yet, again, little of that shows in the documents for 1586. There are the usual issues of cleaning the urban canals, of infrastructure in Rivo San Savino, and one where the Scotti family complained about a lack of water service from Rivo Macinatore to the garden connected with their palace.

¹ Poli, *Le acque di Trebbia*, see bibliography and footnote sources.

The Scotti family wished to upgrade the garden and needed a response from the committee².

Poli describes 1589-90 as a time of infrastructure failure, and indeed it was a difficult time in northern Italy and all of Europe due to the climate. Guido Alfani examined the relationship between famines in Northern Italy and the climate from 1450 to 1800. This period was during what is known as ‘the Little Ice Age’ characterised by an overall decrease in temperatures and the onset of colder winters. But more important in Alfani’s view was the instability of the weather and the increase in rain and wet weather. He claims that it is the heavy rainfall that caused the extreme famine of the 1590’s and the food shortages later during the 1620’s³. But Alfani notes that climate itself, heavy rains, droughts, and severe temperatures cannot account for a famine. He contends that famines are demographic calamities that come when the carrying capacity of an environmental system has been reached. A famine is a failure including both agricultural and institutional management⁴. Alfani contends that the 1590 famine was caused by a confluence of factors that involved a peak of population growth from the 1550’s, lower temperatures, and increased rainfall. He points out the incidence of heavy rains already in the fall of 1589. Such wet weather causes grain diseases like wheat rust that destroyed the harvest⁵. The infrastructure failures could have been due to the heavy rainfall that would have overwhelmed the system. And with institutional authorities focused on the often futile search for grain, the city may have been unable to address the problems.

Surely a time of major crisis should have provoked a response from residents. Little stands out from the documents of the committee for those years, except for the direct intervention of the duke in a couple of routine canal management situations. In a series of interactions, complaints about malfunctioning canals were sent directly to the duke who responded with orders to engage in normal cleaning of the canals, specifically Rivo San

² CSO 3-F2-25, 10 May 1586.

³ Guido Alfani, “Climate, population and famine in northern Italy: General tendencies and Malthusian crisis, ca. 1450-1800”, Dondena Working Papers, Carlo F. Dondena Centre for Research on Social Dynamics, (Milan: Università Bocconi, May 2010).

⁴ Ibid., 8-9.

⁵ Ibid., 12.

Antonino. Those years are also marked by varied conflicts with a man named Rutilio di Laude (or di Lodi) who was contracted to service the canals and often failed to deliver⁶.

How can there be a divide between the discussions in the minutes of the committee recorded within the *Provvigioni* and the record of committee communications in the CSO? Poli also describes this period as one in which the city council, and its committee, slowly gained control of the water system. Is it possible that the committee itself, the CSO, slowly gained in its oversight of the canal system and in its legitimacy with the inhabitants? Direct ducal intervention in the full 200 years of Farnese rule is rare as the duke governed through his representative, the Governor. In later years, such intervention came generally only when the site involved belonged to the ruling family. To intervene on mundane matters, such as normal canal management, implies that the committee had yet to gain full power with the urban population. This situation changed in the 17th century as the number of communications from residents to the committee increased dramatically. Alternatively, having just regained the city, the duke was concerned to be involved and perhaps did not yet fully trust the committee. By the 17th century the CSO had become the place to go for resolution of water problems within the city. With the governor as its head the committee had the authority required to manage the urban water supply.

It is difficult to correlate the activities of the committee with either the pertinent Farnese ruler or other events. However, one decade stands out. That is the decade that included famine (1622-23 and 1628-29) and plague (1630) in which a substantial number of people died, is also the decade with the highest number of documents. This could indicate an increased concern about sanitation, which will only be made clear with further analysis.

⁶ Prince Ranuccio Farnese sent three documents in those years, CSO 2-F1-31, 3-F3-25, 3-F3-26A.

4.1.2 Overview of the documents

There is great variation in the document types per decade. These were tracked as a percentage of overall documents and actions within each decade. The types of documents which dominated the committee's attention varied over time and shifted in total numbers. The documents were classified according to function and to whom they were addressed. The types of documents in this research are 1) communications from residents, letters and petitions; 2) communications from the committee that contained orders of various types and ranged from those addressed to individuals to those orders given to the whole city; 3) legal actions, civil and criminal cases; 4) tax documents, lists of solicitations and fees for service; and 5) reports, generally drafted by engineers and others who worked on infrastructure. Not included as a documented action are committee minutes (*convocati*), and less frequent work orders (*capitoli*), receipts for fees and fines, licenses, bills from contractors, and occasional letters.

To work out a chronological sequence of committee actions the records were assembled into a table by decades. Not all documents come with a date. The *memoriali*, the citizen letters, are frequently undated. Their dates, unless given on the document, are by the year in the folder where they were located in the archive. The committee-issued documents, such as orders and announcements, are usually dated and can therefore be precisely placed in the sequence.

Decade	Petitions	Orders	Cases	Tax/Subscription	Reports	Other	Total
1541-50	3	20	3	0	0	2	28
1551-60	10	39	8	0	3	17	77
1561-70	5	13	8	0	1	20	47
1571-80	3	2	1	2	0	2	10
1581-90	39	67	29	4	3	30	172

Decade	Petitions	Orders	Cases	Tax/Subscription	Reports	Other	Total
1591-1600	35	80	10	5	1	18	149
1601-10	85	81	12	19	12	49	258
1611-20	83	23	9	20	24	53	212
1621-30	259	15	11	11	11	19	326
1631-40	86	16	7	48	1	27	185
1641-50	139	71	19	7	8	60	304
1651-60	72	38	2	5	3	53	173
1661-70	63	16	3	20	2	34	138
1671-80	43	25	1	12	12	28	121
1681-90	88	76	8	28	17	77	294
1691-1700	28	4	10	13	14	11	80
1701-10	39	8	4	10	11	12	84
1711-20	48	20	3	27	6	29	133
1721-30	20	14	2	16	7	17	76
1731-40	11	8	7	22	2	33	83

Table 4-1: Absolute figures for types of documents per decade.

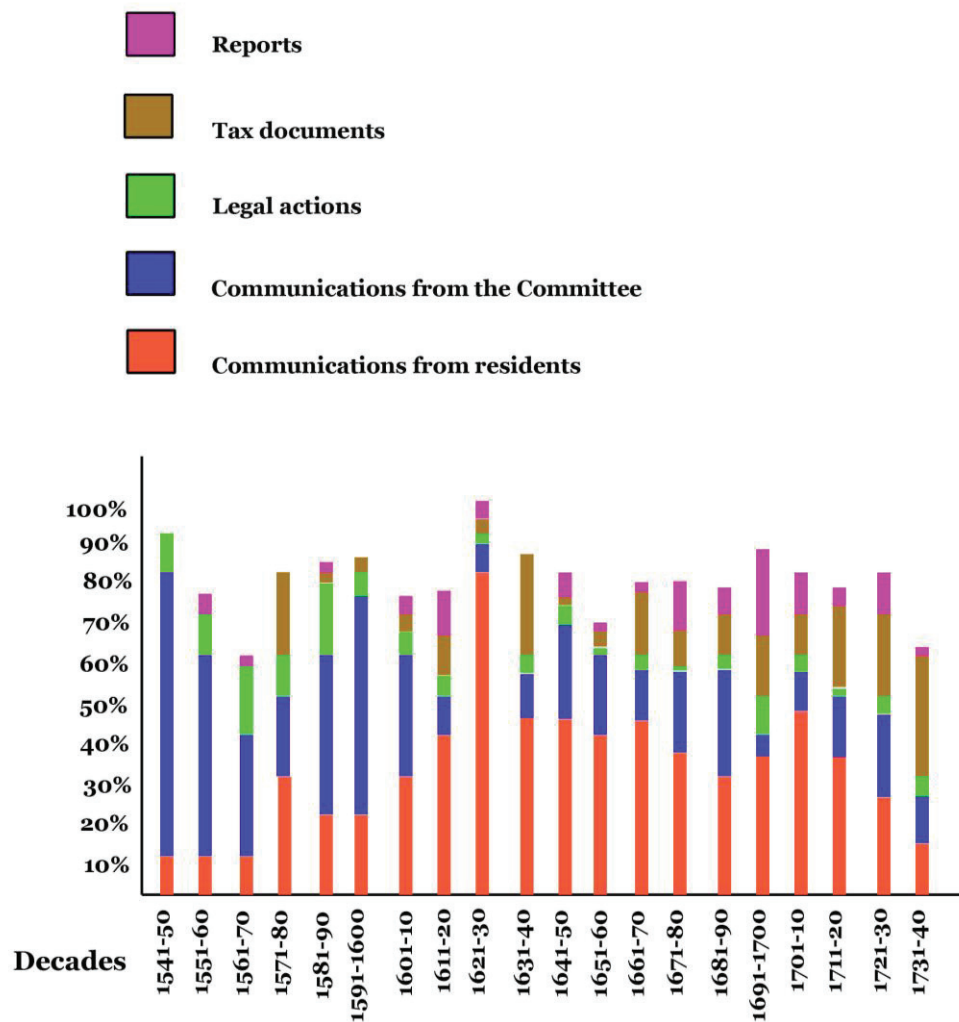


Figure 4-3: Percentage by document type of committee actions by decade.

Over time the communications from the committee to the citizens of Piacenza decreased. The number of orders per decade as a percentage of documents that were released to the city was reduced. At the same time, the percentage of the number of communications from residents as a part of total actions, increased with the peak between 1621-30. Legal documents available within the archive also vary and decrease as a percentage of actions over time. Documents that concern taxation and fees are absent from the early decades but take on a more dominant role in the later years. Reports,

especially by engineers, also increased in importance during the 17th century, perhaps a reflection of the overall rise of the use of experts.

While most documents in the archive are hand-written, over time, especially in the 1690's, some printed orders appeared as well as pre-printed forms that could be filled out as receipts or advisories of impending street work. Printed documents in the archive include:

Document number	Document date	Document type	Comments
14-F1-76F	1641	Small note	Connected to an order
13-F1-1	11 May 1658	<i>Grida</i> (decree)	
16-P1684-11A	20 August 1680	order	
16-P1684	1684	Advisories to neighbourhoods regarding street upgrades	Includes blanks to fill in with street names and locations
16-P1686-1	1686	Advisories for street upgrades	
15-F2-11A	20 august 1683	order	
15-F1-8X	1687	Payment forms/receipts	Includes blanks to add amounts, name and date
AT7-F2-14	June 1687	<i>Sententia</i>	2 pages plus cover of a sentence in a case that involved Rivo Parente (outside the city), the consortia, and the millers guild
AT7-F2-15	1687	<i>Factum</i>	19 pages that explain the facts of the case above

Document number	Document date	Document type	Comments
AT7-F2-16	1686	<i>Testes Examinati</i>	22 pages of testimony related to the case above
18-F1718	1718	Licenses to shopkeepers	
19-P1726-1	12 July 1726	Advisories	With blanks to be filled in
19-P1729	?	Advisories for street work	With blanks to be filled in

Table 4-2: Printed documents in archive.

Typically, the generic forms had space to fill in the blanks with pertinent information. For example the printed payment form from 1687 (15-F1-8X) appears like this:

Sig Ludovico Roffi computista in questa parte per l'Illustrissima Congregazione della Policia Piacenza. Piacere a V.X. spedire un mandato diretto al Sig Orazio Bonfanti Tesoriere dalla sudetta Illustrissima Congregazione della Policia di Piacenza, confermato da sua Altezza Serenissima, che paghi a (filled in by hand)

Lire ____ Sol. ____ Den. ____

Moneta corrente, quali sono per

Dico _____ Lit. Fs. i.

Piacenza li _____ di _____ 1687

Signature: Paolo Carino, Cancell

Regist al Libro de gli Ordini dell Illustrissima Congregazione della Policia fol. M.

This pre-printed form is designed to allow for amounts owed to be filled in along with the date within the year of 1687.

Communications from residents: *suppliche* and *memoriali*:

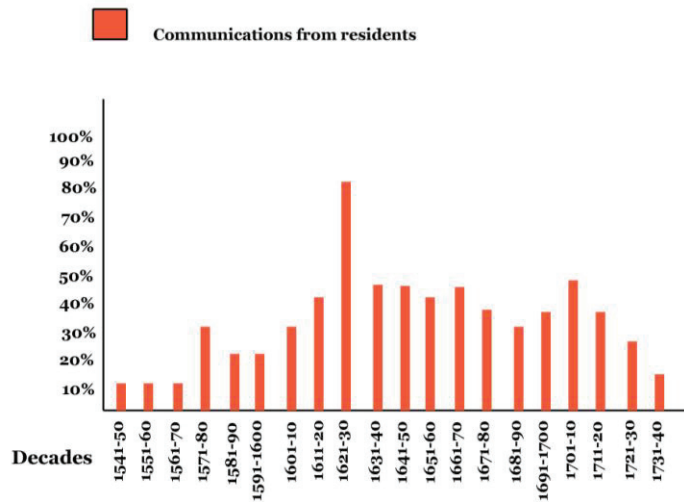


Figure 4-4: Percentage of communications from residents as a document type within total committee actions by decade.

On the side of the inhabitants are petitions (*suppliche*), pleas, reports, and grievances (*memoriali*). Documents labelled as a *memoriale* dominate the residents’ record. The term *suppliche* as a document title was used only a few times in the period of 200 years though *suppliche* about various issues to the duke were common. Over time these inhabitants’ letters of all types developed a format that was used almost universally. This was possibly due to the employ of intermediaries as the actual letter writers, quite probably a scribe with some legal knowledge. The sender, whether an individual or institution, would begin with salutations to the committee in formal address, identify him or herself, and his/her location within the city generally by parish, but also often by street, and finally rhetorically indicate that the writer was a servant to the committee. What followed would be either a succinct description of the problem or possibly a much longer description that filled several pages. The final paragraph almost always began with words that indicated a humble request for service to be restored or repaired, for a visit by a committee member or engineer to assess the problem, or for a release from fees or

penalties. Quite frequently the writer would inform the committee of the action it should take in response to the grievance. What is startling about the many letters written to the committee is the level of knowledge about the water infrastructure. City-dwellers could normally name not only the canal that was involved, if one was, but also name the kind of infrastructure that required repair or new construction. They were able to use the technical names in a way that many urban inhabitants today would find impossible. It is possible that the dynamics of this system, so closely connected to the rise and fall of the Trebbia River, with an ongoing need for human interaction, meant that people had to be informed and knowledgeable about it.

In 1637 a *memoriale* submitted by Santa Maria Maddalena, a convent, and others in the area reported that many people in the neighbourhood were irate about a street drain that required repair. This drain not only managed rain water but also collected a great deal of rubbish or waste from the nearby meat market. In fact, the writer asserted, it was the large quantity of gross waste from the market that caused the problem as it blocked the drain. Repairs were required that also took into account the carts that used the street. Included in the complaint is the issue of the *pozzi dalle immonditie*, the cistern for waste. The writer concluded that since they wanted to and did enjoy the benefits of the water utility, they hoped to see the drain repaired. A note in another hand on the front of the letter indicates that the committee responded with a visit to verify the extent of the problem⁷.

As with this letter, writers most frequently sought to inform the committee of a problem in water supply due to infrastructure breakdown. A lack of service could be caused by damage to the infrastructure triggered by flooding or because of rubbish and waste that blocked the water flow. These types of letters were also used to ask for licenses to construct pipelines from canals into homes for private water service, or to construct the conduit and drainage network required to channel rainwater off of the street in front of a business and into a canal. It is plain from the remarks of citizens that they

⁷ CSO 10-F2-37.

expected water service to their homes and streets kept from floods after rain storms by the mid-16th century.

In 1638 the miller Massimiano delli Magliorini wrote to complain that the inlet into the channel that served two mills in the neighbourhood of San Nicolo di Catanei was open according to the license given by the committee. However there was an urgent need to clean up the canal. He described a large amount of rubbish and waste and even two dead dogs in the channel, which all impeded the flow of the water. This was a cause of problems for the miller as he could not remedy the situation and still had to pay rent. In light of the problems with the water service the miller requested that the committee reimburse his fee⁸.

At times a letter was used to inform on another person who had caused a problem with the system or failed to fix it as required. Quite frequently millers were cited as the ones who failed to close off a part of the canal at the right moment and thereby caused a flooded basement. Because the system was gravity-fed, it was highly responsive to the conditions of the Trebbia and every decision made about the canals as the water travelled through the countryside to arrive in the city. The channels required constant manual management of the water by a large number of different actors with diverse authority. Any failure of action affected those further downstream and elicited complaints.

It is difficult to classify *memoriali* according to sender/writer and their identification. Many of the letters to the committee were from groups of people that might include millers, ecclesiastical institutions, churches, nobles, associations, and others connected to the infrastructure in question. People did tend to name their profession or give their title. This was especially true if the writer was a miller or gardener as they had extra rights and responsibilities towards the water system. Most

⁸ CSO 10-F2-43. Note that this is the only letter over the course of two hundred years that refers to dead animals in the canal. ' . . . che fosse aperto una boca, dil Rivo che va alli doi Molini, che sono su la Vica d Sto Nicolo o'Catanei, et la detta boca fu aperta dali Molinari cum licentia, et anco x urgente bisogno, per netare et levare fora, d'una ferata quale e posta in detto Rivo, molte immonditie, in spetie doi Cani morti, che impedinaro il corso dell'aqua di detto Rivo, . . .' Overall, what came out of the canals was described as earth or rubbish. It was removed by the millers and those who cleaned the canals.

importantly they always identified their parish neighbourhood and sometimes added details to better locate the infrastructure that was the subject of the letter. Due to the way the letters were written a definitive analysis of senders is not possible. Instead 983 *memoriali* that span the time period were examined for information on the writers and senders⁹. Those sent by a group identified as a *consorti*, or people who lived in the neighbourhood with the problem, were not analyzed in terms of the individuals that signed but were counted as group missives. These totalled 109 or 11% of the 983. However there were other letters that involved multiple persons. These letters counted as singles since the names of the writers were given separately and not as a group, nor were they named as an organized association like a *consorto*. Letters that contained a single name or those of several brothers and family members, or with a couple of named but seemingly unrelated people without other identifying characteristics, numbered 497 or 50%. Letters in which the writer gave an occupation or position were counted separately. Those who identified themselves with a noble title numbered 43 or about 4%. A few individuals used military terms to identify themselves such as *Sargente*, and *Caporale*, and totalled 16 or around 1.5% of the total. Various occupations were included in the letters such as merchant or fruit merchant (22), dyer (8), fisher or boatman (5), owner of a kiln and gardeners (8), these together, account for 43 or 4% of the total. Some letter writers identified themselves as professions or leaders of organizations like doctors (12), notary and *fiscale* (2), and hospital administrators (6). Together these totalled 20 or 2%. There were a few, a total of 18 males and two females who used the preface of Signor and Signora in their letters, also 2%. Some writers identified themselves as masters without designating the industry but others used the term *muratore* or mason and a few were named as a *massaro* (the term used for those who were in charge of the well-being of street infrastructure), as a cluster of those in the building trades. These together totalled 15, almost 1%. A large group was the millers as individuals or groups of individuals. There were a total of 88 or almost 9% of the communications from them. There were five letters from the group that ran the meat market. The final group who wrote the CSO on a

⁹ This number was the total of those *memoriali* in CSO buste 1-19 that had sufficient information to make a classification.

frequent basis were ecclesiastical institutions, churches, convents and monasteries and individuals associated with religious institutions such as priest, clergyman and provost. In this count they accounted for 125 or nearly 13% of the total number of correspondents.

It is unclear if the number of letters from religious institutions correlates in any way with the actual land owned or managed by them within the city. Religious institutions held diverse properties across the city that included convents and monasteries, churches, mills, presses, fields that were rented or directly farmed by the institution, and rental properties that could be located anywhere within the urban space. It is beyond the scope of this thesis to calculate the total amount of land owned by the diversity of religious institutions in the city. However, it is to be noted that ecclesiastical institutions, with multiple types of water usage, from residential to kitchen gardens and mills, were heavy users of the utility.

A total of 28 communications were sent by individual women in the record¹⁰. These women tended to be either noble or else claimed poverty with a request for a return of their pledges. In some cases they made a complaint about water service. In July 1611 Signora Prudenza Landi (a feudal family) wrote the CSO to complain about the poor service she received for her money. She explained that she had paid a portion of the costs to clean out Rivo Beverora but the miller from San Agostino had not done a good job. She requested repairs so that the water could flow freely. In 1617 Signora Drusilla Scotto Anguissola (another feudal family) wrote to complain about a small canal called Rivo San Bernardo that had overflowed into her courtyard, flooded her basement, and caused much damage. She primarily blamed a miller for bad water management¹¹.

Letters came also from women who were not from noble families. In 1617, Barbara delli Marti wrote of how she had four children and thus was too poor to pay water fees. In 1623 Anastasia delli Tirona complained twice of *acqua brutta* (technically ugly water which quite likely contained sewage) in the street outside her home and in light of the

¹⁰ In one instance a woman was identified along with her husband although the husband is identified first.

¹¹ In order of mention: CSO 7-F1-4 and 7-F2-1.

water infrastructure breakdown and her lack of funds, she also wanted remit of her payments. In 1628 Veronica Paradisa requested a license to build a drain and pipe outside of her house to move rainwater off her property. In one case a woman was identified in a letter as the wife of Alberto Ceretti; he and his wife Prudentia were also poor and required repayment of their fees. Francesca Biancha wrote on behalf of her and her husband, G. Andrea Nano, in 1627, about a cistern near their wall that had allowed sewage into their home. In 1630 the CSO received a petition from Veronica Berna and her spouse about Rivo San Savino. The other women present in the archive tend to be the directors of convents who wrote in their professional capacities about water problems near or on their sites¹².

Pleas of poverty from self-identified poor women escalated in 1629 and 1630 in response to the stresses of the plague. In 1629 Catterina Colombana wrote about the costs of water at 96 lire per year. She mentioned another fee of 203 lire. These seem to be extraordinary costs and are close to what a poor labourer would earn in a year¹³. Obviously both fees were beyond her means. Also in 1629 Cattarina Marenga petitioned for release from a payment of 10 lire and 13 soldi to clean Rivo San Savino. She explained that she was poor and had small children to care for and commented that others should pay more of the costs. Catterina delli Colombana petitioned again on 19 November 1629 for release from that year's payment and again in 1630. In that letter she described herself as poor with 11 persons in the family. She gave numbers to explain her financial situation. Inserted into the petition is the testimony of a witness who also noted that Catterina had a license to beg and was indeed poor¹⁴.

These generally short letters appear to be the principal means by which city-dwellers communicated with committee members. People who lacked the means to finance their part of the system used these letters to plead poverty and ask for financial relief. Others requested a refund of fees due to lack of service. Through these notes, the committee

¹² In order of mention: CSO 7-F2-12, 8-F2-16, 8-F2-18, 9-F1-8, 9-F2-31, 8-F2-127, 9-F2-37.

¹³ It may be that these amounts refer to a building with several households.

¹⁴ In order of mention: CSO 9-F2-14, 9-F2-23, 9-F2-38 and 9-F2-38A.

members were made aware of difficulties with the infrastructure and problems between the different people who built it, repaired it, and used it on a daily basis.

Communications from the committee: *istanze, avvisi, mandati, proclame, gride*

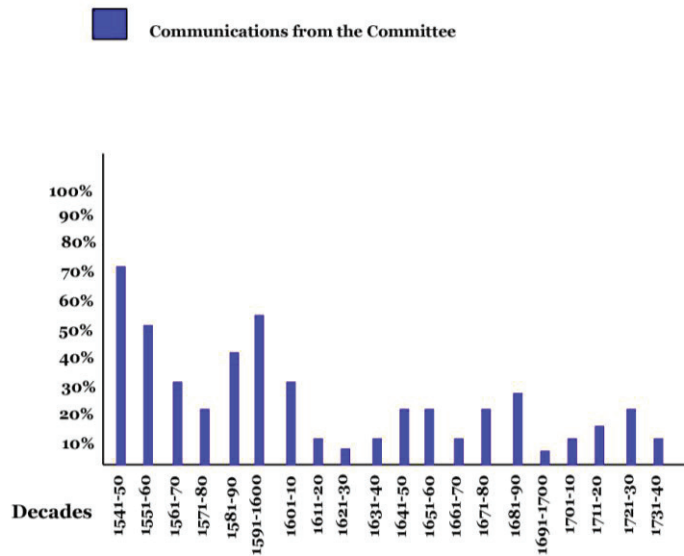


Figure 4-5: Percentage of communications from the committee as a document type in total committee actions, by decade.

Once the committee received a communication from a resident, orders were issued that escalated in urgency and severity as long as the problem required resolution. Orders could be specific to a single person who was obligated to clean part of a channel or fix a smaller pipeline. The order could instruct a consortium of millers to do an annual or regular purge, or to clean and excavate a major waterway. From time to time decrees were issued for the whole of the city. Everyone, no matter their status or condition, was called upon to clean out their local waterway, to remove any impediments, and to lift and carry away the silt and dirt that diminished the water’s flow. Such orders provided employment for those who lacked it as higher-status residents could hire them to do the dirty job of canal maintenance.

On 30 August, 1604 municipal authorities issued a *proclama*. In it they described how they and the duke were disturbed by problems with Rivo San Siro and the inlet near the mill of Galeani located outside of the city gates at Porta di San Raimondo. The many impediments along with diverse rubbish had caused damage to public and private interests. The proclamation went on to declare that it was time to dig out the canal, repair parts of it with good materials and to generally upgrade the infrastructure¹⁵.

In 1606 the committee issued an order that allowed a homeowner to construct the required underground piping for water service into his house. On 10 August 1650 the CSO issued an order that gave three days for the parties to clean up soil in the road that had been removed from Rivo Meridiano¹⁶. These were typical of committee orders, often addressed to an individual or to a small group of neighbourhood residents to construct or repair infrastructure.

Gride or decrees were commonly issued citywide and followed a formula that announced the name of the officials who were involved, to whom the decree was to be addressed, the need for action, the action to be taken with a time limit for compliance, and a statement of the penalties to be incurred for failure to fulfil the terms of the decree. For example, on 6 November 1607, the governor along with officials of the committee issued a decree to the people appointed to oversee the condition of the neighbourhood streets. These caretakers were called to write up reports that detailed the condition of their neighbourhood's stone and cobbled streets. Many were in poor condition and out of repair, which had caused problems for horses, carriages and the public. They had eight days to make these reports and the findings from each street caretaker would lead the committee decisions for repairs. A failure to comply in time would result in a penalty of 10 *scudi* of gold, of which 1/3 would go to the ducal administration, 1/3 to the committee, and the final third to go to another official¹⁷.

¹⁵ CSO 5-F2-1.

¹⁶ In order of mention: CSO 5-F2-26 and 12-F1-20A.

¹⁷ CSO 5-F3-15. ‘. . .sotto la pena in caso de imobedentia di scuti deci de oro per cadauno massare da esser applicati per uno terzo alla Serma Ducale Camera uno altro

These kinds of orders always listed a penalty for noncompliance, normally a fine. Sometimes a clause would stipulate that, in the case of disobedience, the committee could take other measures that included corporal punishment, as they saw fit. The amounts of the fines varied from minimal amounts to those that appear significant, although petitions to the ducal administration for fee reduction were often successful. There is little material in this particular archival collection to make clear how many fines were collected for a total amount per year. The records for some years contain small paper receipts that noted down that a particular person has paid a fine or pledge, but the formula used to write the receipt did not include explicit information on the reason for the payment or if it was connected to the failure to respond to a charge to clean a canal. Thus it is not possible to connect these receipts to an actual order from this particular set of records. The archive does contain requests for reimbursement of fines or pledges already paid because the required work was done. These appeals often contain comments at the bottom that indicate the funds were returned once the work was completed. This system penalized noncompliance but then rewarded conformity even if it was late.

terzo al officio della Politica et altro terzo al inventore (hole) alla satore. . . .⁶ The word used for the final 1/3 of the fee is *satore*. The only translation for this has been found in a 1611 dictionary compiled in Britain and it refers to a *satore* as a husbandman or caretaker. More likely the word is a form of *esattore*, a tax collector or collection agent.

Legal documents: *causa, querelle*

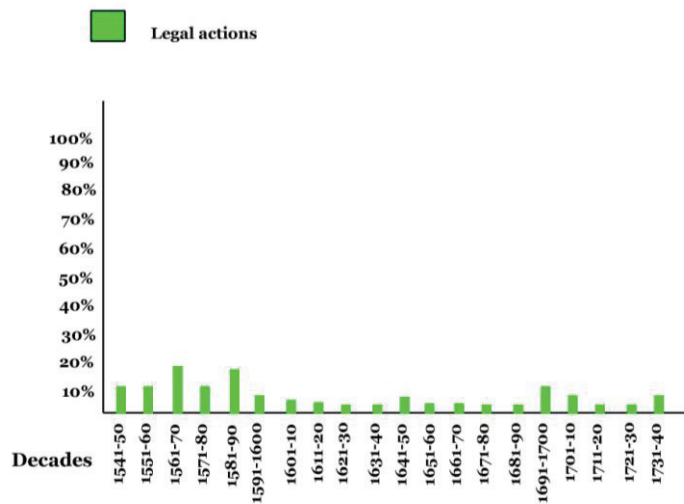


Figure 4-6: Percentage of legal actions as document type within total committee actions by decade.

If all else failed to resolve a conflict between users or between the city and users, the committee could sue in civil court or place criminal charges. Water theft, or the use of water outside the allotted rights, led to criminal charges. But many times users engaged in disputes with one another over their particular rights and management of the infrastructure for which they were responsible. This was a shared system. Everyone was affected by how their neighbour managed their part of the infrastructure. If their neighbour failed to open or close a lock for which they were responsible at the right moment a basement could be flooded and the materials stored there destroyed or the channel might run dry and a miller would lose his earnings. When these kinds of cases involved disputed water rights, civil court and legal suits (*causa*) were the avenue for resolution.

The documents for civil cases within the archive are not easy to read. Most are in Latin, the language of tribunals, or a mix of Latin and Italian. Many of the documents are in worse condition than the other articles within the collection. They may have been stored separately and suffered damage at some point. The Jesuit Latin utilized many abbreviations and is difficult to understand or translate. In most cases, for this research,

the case was read enough to understand if it involved a canal or other water infrastructure, what that might be, and if possible the parties involved. A few confessions and interrogations are also in the archive. These often have readable sections in Italian and have been included in the legal documents section even if they only partially explain a case.

Expert reports

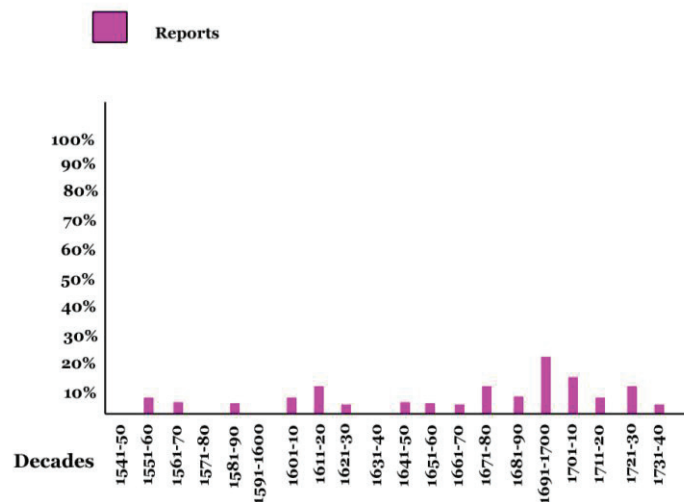


Figure 4-7: Percentage of reports as a document type within total committee actions by decade.

Often the first response of the committee to a letter was to send out a committee member or an engineer to inspect the site and report on the problem. The committee employed expert engineers to figure out both the problem and its solution. Sometimes other committee members, deputies employed by the committee, or city officials would also visit a site. After the site visit, the engineer wrote a report that detailed the location of the problem, the cause, and the construction or repair needed to fix it. He would normally include the costs involved. Over the course of two centuries there were relatively few men employed as engineers for the committee, as they tended to stay in the position for life. The first name in these records is Hieronimo Bonadeo in 1559. Alessandro Bolzone and his reports begin in 1600. Another family, the Cremonese, were employed as father and son and grandson later in the 17th century and into the 18th

century. These reports are often clear descriptions of the run of a canal through the city with details of property and street crossings.

The experts were identified by a variety of titles. In Valeria Poli's work on the professions as they developed in the city she lists the officials that oversaw the system. Titles include: *esperto misuratore* – an expert measurer of water, *ingegnere comunale* – city engineer, *agrimensore pubblico* – public surveyor, *architetto* – architect, and *periti eletti* – an expert or assessor¹⁸. In their own reports the experts identified themselves as engineers and surveyors¹⁹. They were also identified by others. In a note about expenses by Jacamo Agnis, the deputy to the CSO on 12 June 1665, he referred to Alesso Cremonese as architect. But there is obvious fluidity in the terms as in a tax document from the 1680's and again in a CSO order from 13 October 1681, Alesso Cremonese was given the title of surveyor²⁰. In this thesis they will be referred to as engineers and city engineers.

A report by Giulio Cesare Trompelli dated 11 December 1621 is typical for many of the reports. In this report, on orders from the committee, he visited the site where Rivo San Agostino passed the monastery of San Siro and irrigated their small urban garden after which the waterway continued on through the cloister of San Antonino where it divided. Part of it ran on to service two mills owned by Giovanni Battista Rossa and the heirs of Franco Giorgi. The mills used water from Rivo Meridiano and were busy in the summer time. They were located near the Fodesta Gate at the far downstream end of the system. The engineer made recommendations about what parties should carry the costs of repairs to the infrastructure²¹.

¹⁸ Valeria Poli, Architetti, ingegneri, periti agrimensori. Le professioni tecniche a Piacenza tra XIII e XIX secolo, (Piacenza: Banca di Piacenza, 2002) 22-25.

¹⁹ CSO 5-F6-10 Bolzone identifies himself as *ingegnere* or engineer, A12-F1-7C Bonades identified himself as *agrimensore* or surveyor, a job that entailed mathematical calculations.

²⁰ In order of mention: CSO 13-F1-56, 15-F1-21, 15-F2-3.

²¹ CSO 8-F1-18.

Experts frequently commented not only on the costs of repairs but also on whom they felt should bear the costs. At times they also made up subscription lists and collected the taxes to finance the system.

Tax documents: levy of fees and taxes for repairs or new work, *compartito* and *distaglio*

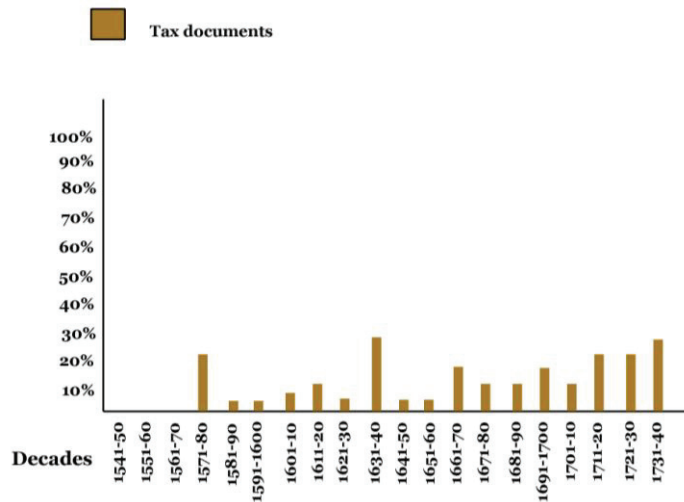


Figure 4-8: Percentage of tax documents as a document type within total committee actions by decade.

Like any corporation, the city was concerned with the economics of its infrastructure. Thus, initially the system was a user-pay arrangement. When the CSO granted a concession, it often stated what waterways the person or institution who received the rights was responsible for, and how often maintenance was to be carried out. When work needed to be done on a channel, the deputy or engineer would make a list of the names of all those considered responsible for the site, which could include millers, gardeners, homeowners, business owners, *consorti*, convents, monasteries, and churches. The deputy then calculated who owed what payments for the work on the waterway. At times the deputy also collected the taxes and fees and signed for the amounts he gathered. The payment per user depended upon the type of service each received. For example, a garden

or mill was taxed at a higher rate. Gardens generally paid according to the amount of land involved while mills paid based on the number of mill wheels. Homeowners paid either by type of service, that is, they had control of a small lock or an opening in the canal, or by the length of the pipe that ran from the channel to their home. Later tax lists included the number of pit toilets in a residence or institution and taxed it appropriately. Over time the system of fee solicitation and the expectation that individuals would arrange for the work to be done shifted slightly. Occasionally, in later tax documents the work cited, for the purposes of taxation, occurred one or two years before the actual collection of funds. This shift occurs over time with the first tax document that mentions past work dated 2 November 1695 for work in 1694 and another on 22 May 1710 for work done in 1709. The shift accelerated though was not consistent. In 1717 a number of tax documents relate to work done in past years. One from 28 July 1717 mentions work from 1715, another from 27 November 1717 described work done in 1716. The city continued at times to get repairs done before actual taxes were collected. On 23 July 1730 a tax document was issued that concerned work done in 1726. By mid-18th century this format became normal²².

For the purpose of this analysis tax documents include those lists of owners and users that the city created when it considered work and costs, or simply as a means to determine who was accountable to contribute to clean the canal. These lists could be quite long depending upon the portion of the canal that was involved. Several hundred land owners and those with other rights could be called upon to make a contribution to large-scale work. Other documents are quite short and may have only involved a few millers, who were accountable to finance or actually carry out the work on the canal in question. The documents show that there was an attempt to rationalize the taxes and fees for system users and to maintain a level of transparency when it came time to collect funds.

Towards the end of the 17th century, these tax documents acquired a more consistent format. Typically, in later years the *compartito* or *distaglio* gave a detailed description of the work to be done followed by the specific fees and costs. In one from 2 November

²² Documents that show this trend include CSO 17-F1694-4, 18-F1709-37, 6-P1701-4, 18-F1714-42, 6-P1701-2, 6-P1701-3, 6-1, 6-P1701-27.

1695 there is a full first paragraph that describes the work done in July 1694. This is followed by further paragraphs that describe the work and costs for infrastructure followed by the names of those who would pay for the work and individual tax fees²³. A *compartito* from 22 May 1710, written by engineer Bartolomeo Cremonese, specified that the taxes were sought to fund a purge of the Rivo Trebbiola in the Castello, repair the side wall, cover the rivo with strong stone, remove the earth that was purged and pave the road. Total costs were projected to be 778 *lire* and 10 *soldi*. The costs to subscribers were based on the amount of land in irrigated urban food gardens. The cost per *pertica* was 15 *lire*. Pit toilets (*cessi*), which must have been connected into the system along with ownership of a drain were taxed at the rate of 4 *lire*. Less clear is the term *trabucco di cavo*²⁴ which were listed to cost 9 *lire* and 15 *soldi*. The charges were for the month of July in 1709. A list organized under the headings of subscriber name/*horti* with number of *pertiche*, and *cave* with number of *trat* (*trabucco*)/cost follows the opening explanation²⁵.

It was beyond the scope of this analysis to track individuals or institutions and their tax payments and fees over time. An important next step to further this research would be to go through only the tax and solicitation documents and record the names of individuals and institutions so that payments could be traced over the 200 year period. This would give a better understanding of how the finances for the infrastructure worked across the city.

Other documents: *capitoli, licenza, notta, convocati*

Not included within the overall count of orders issued by the committee are other documents issued from time to time. Some of these are concessions or licenses for particular work and new infrastructure. When a concession was made it would sometimes involve a *capitoli* or what appears to be a work order. *Capitoli* were not connected to

²³ CSO 17-F1694-4.

²⁴ A *trabucco* was a measure of length that equaled 6 *braccia* (.47m) for a total of 2.8m. This could be the linear measure of excavation that the subscriber was responsible to pay for as part of their water service.

²⁵ CSO 18-F1709-37.

every license issued, they seem to have been used on major projects and infrastructure investments or when an institution or consortium was given rights over part of the infrastructure. The document, done in numbered sections, which are the *capitoli*, spelled out the agreement between the city and the institution or group that received the concession.

On 17 August 1613, the governor signed a *capitoli* for a group that wanted to install drainage in Strada Crosa all the way to the Cittadella. The work order detailed the location of the infrastructure, the obligations for construction, repair and maintenance, the materials designated by the document which included good stone, mortar and mortar with lime, as well as the dimensions and specifications. The specifications are often quite technical and there was a concern about the use of appropriate and durable materials. Details were given about stone inlets into the sewer conduit, their location, what they serviced, and how the materials worked together²⁶. Obviously in a hodge-podge system constructed by many individuals over time there had to be some way to ensure that pieces fit together and worked as a whole. Otherwise the system would have failed.

Document number	Date	Main canal	Infrastructure	Location	Land-use
1-P1554-4	1557, 26 April				
1-F12-4	1558, February			Strada San Antonino	
3-F1-9	1581		Paving		
3-F2-5	1585		Paving	Strada Farnese	
3-F2-23	1586, 13 April	San Savino	Conduit	San Bernardo	
3-F2-26	1586, 30 May				

²⁶ CSO 7-F1-28F.

Document number	Date	Main canal	Infrastructure	Location	Land-use
3-F2-27	1586, 31 May		Paving		
3-F2-28	1586, 31 May		Road work		
3-F2-17	1586, 31 May		Paving	San Salvatore, Borgo, Santa Brigida	
2-F1-18	1586	San Savino		Strada Farnese, San Bernardo	
4-F1-5	1599		Conduit	Santa Maria della Pace	
4-F2-2	1600, 4 October				
4-F3-12	1601		Rain water conduit and drain	San Giacomo	Garden
5-F1-10	1605		Drain		Garden
5-F1-12A	1605, 10 September	Rivo Grande	Drain		Garden
5-P1608-1	1608, 9 June		Paving	Strada Farnese, San Raimondo	
5-P1608-2	1608				
5-P1608-3	1609, 29 July	Canal Grande	Drain	San Giovanni in Canale	
5-P1609-3B	1609		Drain, inlet		
5-F6-1	1610, 10 May		Paving		

Document number	Date	Main canal	Infrastructure	Location	Land-use
7-F1-28F	1613, 25 August			Strada Crosa, the Cittadella	
7-F1-28E	1613		Drain	Strada Crosa	
7-F1-29C	1613, 22 October	Rivo di Carmine	Inlet	San Sisto	Mill
7-F1-50	1616	Rivo Meridiano	Drain	Meat market, Duomo, piazza delli ortolani	
7-F2-2	1617	Rivo del Molino di Fodesta	Bridge at Porta Fodesta		Mill
AT2-F1-12	1629, 7 October	Rivo San Savino	Wall, vault		Mill
13-F1-51	1663, 22 May	Rivo San Agostino		San Siro	Garden
17-F1694-24	1696, 12 June				
17-F1694-33	1697	Rivo San Agostino			
19-P1733-9A	1733	Beverora	Conduit	Porta San Raimondo	

Table 4-3: *Capitoli* with date, water channel, infrastructure and location.

When analyzed by decade it can be seen that this kind of major investment is clustered during the early decades of the Farnese reign. The number of *capitoli* issued per decade ranges from a low of 1 to a high of 8 in 1581-1590 and in 1601-1610. The earlier decade is consistent with the reforms of the system initiated by Ottavio Farnese in 1585 and with

the problems that triggered the reform. It could be that, with a period stability, ecclesiastical institutions and individuals decided they either had to or were free to make new infrastructure investments. The later decrease may indicate that the city had essentially built-out its infrastructure to meet the needs of the population which stopped growing after 1600, and little more was necessary.

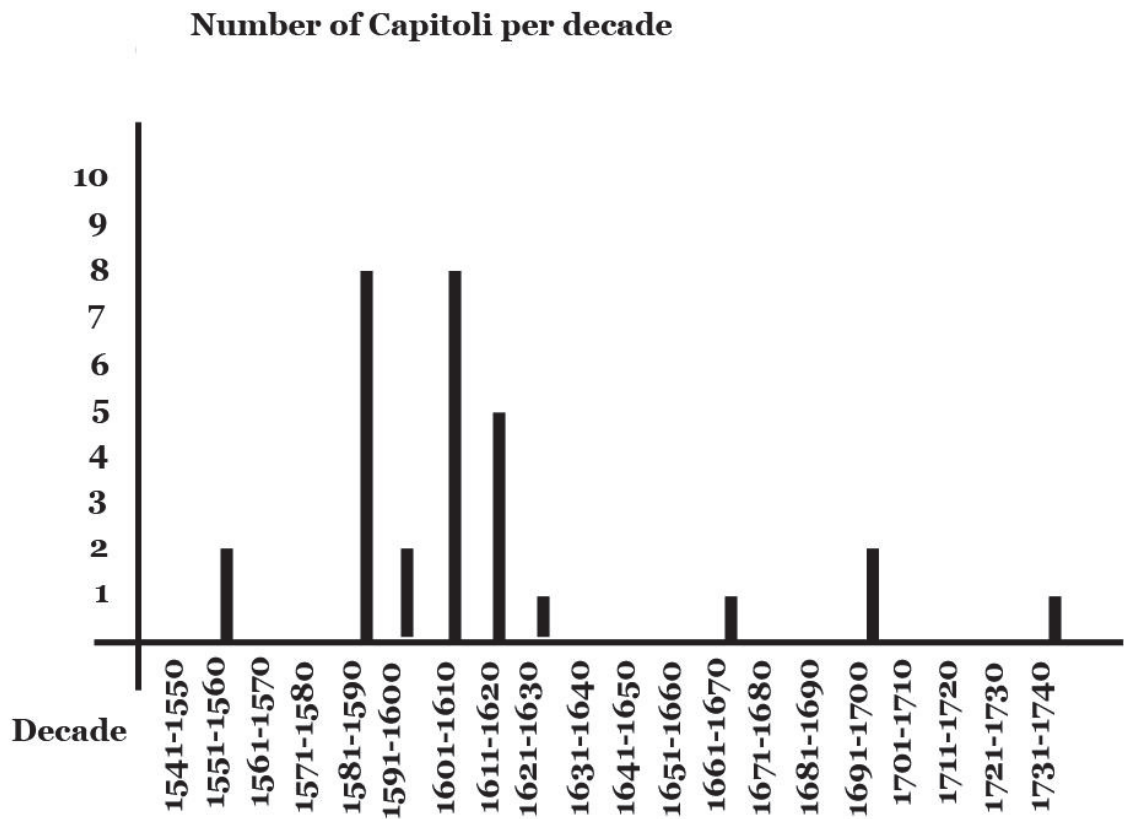


Figure 4-9: *Capitoli* per decade.

Licenses tended to be shorter, quite often a simple record of a fee paid for a concession such as the installation of a drain pipe from a household courtyard to the street drainage system. They operated much like building permits do today.

The committee was equally concerned about accurate accounting of costs. Included in the archive are bills from the contractors who did the work of repair and maintenance of the infrastructure. These bills were quite specific about the work done, the length of time it took, the materials used, the number of workers involved, and the amount of wine purchased for them. Sometimes the bill came through the deputy and indicated that the deputy had already paid for the repair and sought reimbursement from the committee. It is unclear how the committee determined who exactly would do the necessary work on the system. Some orders called for urban inhabitants to do the work because they owned a home or business that bordered on the waterway. Yet the bills make obvious that at other times a contractor was brought in, often with a crew, to do what was needed on the utility.

The final category of documents in this archive was the *convocati*, which appear to be the minutes of the committee meetings. Sometimes they were gathered into small packets or booklets. While this record is incomplete and inconsistent over the 200 year period, it is apparent that the committee met frequently, weekly or even twice a week. While individual members could be absent, the sense is that this was a real working committee. These people had to make decisions about infrastructure management on a regular basis, and they had to respond quickly and promptly to emergencies and breakdowns. The minutes tend to be terse and succinct and give little information about actual committee discussions. They covered topics other than the water system but when they dealt with canals the engineer would often be on hand to give a report. There is no record of votes taken, only of decisions agreed upon. The committee met under the ducal-appointed governor's leadership, had a rotating chairmanship, and almost always included the water commissioner, the Referendario, for the whole rural and urban canal system. The governor would have supported ducal interests within the committee, backed by the power of the duke.

A sample sequence of *convocati* indicates that the committee met on 4 June 1611, 5 days later on 9 June 1611, 9 days later on the 18 June, but then within 4 days on 21 June and again on 9 July. In that time they twice discussed the Beverora canal, on the 4 June and 21 June. The membership of the committee is evident in this sequence, with noble

citizens who represented the important historical feudal families in the Farnese reign. On 4 June the Casati and Landi members were absent. On 9 June the Scotti member failed to show. On 9 July the Governor, the acting chair, the Landi and the Anguissola members were present. It was a small committee and over time members would have gained acumen and expertise in management of the system. The small numbers may well have facilitated decision-making. Another sequence of *convocati* show fewer meetings during the year of 1646. The committee met on 31 January and discussed Rivo San Agostino, on 19 April, and on 2 August when they focused on Rivo Piccinini and Rivo Beverora. Again on 23 August they talked about Rivo San Agostino. They rounded out the year with meetings on 10 September, and 22 November when they dealt with Rivo San Savino²⁷. This sequence shows far fewer meetings for the committee especially in the summer when the complaints often rolled in about smelly, turgid canals.

²⁷ See *Appendix A* for a full list of *convocati* used in this research.

4.2. THE WATER AND SANITATION SYSTEM OF PIACENZA

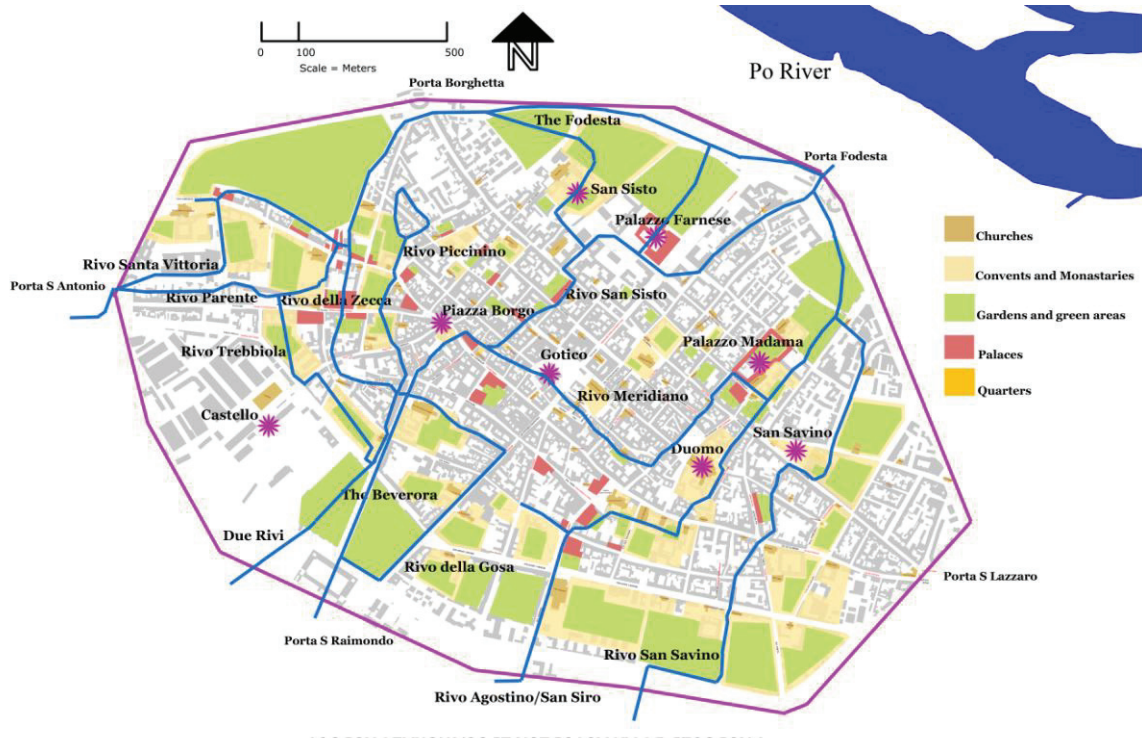


Figure 4-10: Map of Farnese walls, canals, landmarks, palaces, green spaces and monasteries and convents in Piacenza on contemporary footprint.

4.2.1 Aspects of the Integrated System and documentation

The documents on water management divide the system into roughly 3 parts:

- 1) the first group deals with the canals themselves directly;
- 2) the second group addresses street drainage: and
- 3) the last set of papers involves sanitation through cisterns.

The canals were the largest infrastructure in the city and were the integrating factor for other aspects of the system. Both street drainage and sanitation connected into the canals; thus the canals have their own special history and management issues at the urban and regional scales.

What is missing in the documents is anything on drinking water. There is little mention of water to drink aside from white or sweet water wells. While there are complaints about polluted canals and cisterns there are no comments on polluted drinking water or water that contained sediments or smelled when someone wanted to quench their thirst. This is perplexing. How did the people of Piacenza obtain drinking water? If it was from the canals then their health would have been negatively affected by the pollutants in the water, if it was not from the canals, then how? A next step would be a search of notarial documents from house sales which may hold the answer as a fountain or well would have been described in the sale documents.

Squatriti contends that for Medieval Europeans water quality was important, especially if it was to be consumed. Since bacteria were unknown the quality of the water was determined by limpidity and odor. Early Medieval users wanted their water clear and odor free²⁸. Cities also went to great effort to satisfy the needs for human consumption and cooking. The Piacenza canals would have had a difficult time, especially during a hot summer, satisfying the criteria for purity. There were complaints of smelly canals and fetid water during low water periods. This implies that residents of Piacenza got their drinking water somewhere other than the canals. The best possibility is shared or private household wells especially since Piacenza did not have public fountains. Yet these private wells appear not to have been within the purview of the CSO except when contaminated by polluted water from flooded canals and the subject of a complaint.

²⁸ Paolo Squatriti, Water and Society in early medieval Italy, AD 400-1000, (Cambridge: Cambridge University Press, 1998), 36.



Fig 4-11: Piacenza, Pinata della Città, disegni originale 1803, scale in trabucchi. Archivio di Stato di Parma (ASPr), mappe vol 21/36.

4.2.2. Range of Infrastructure in Documents

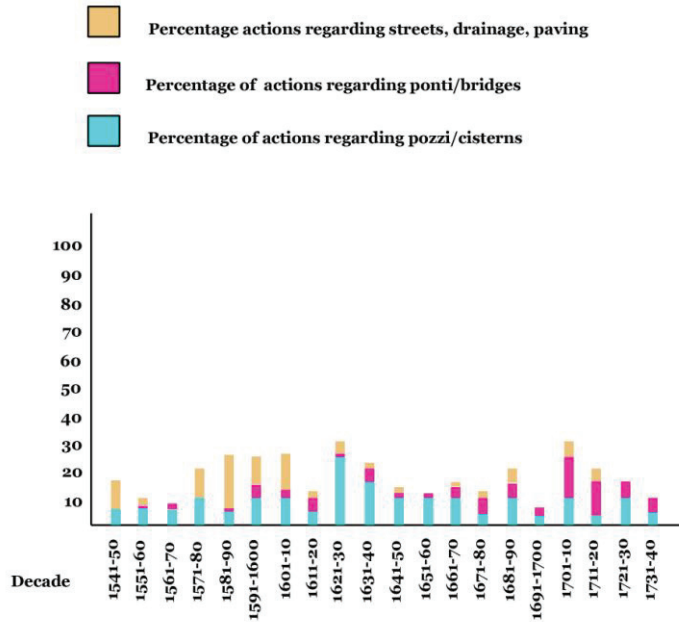


Figure 4-12: Percentage of actions for different forms of infrastructure.

Any infrastructure that involved water or sanitation in the document was included in the survey for this study. The results show two primary points of focus for the committee in terms of water management. First, the maintenance of the canals ensured the energy supply to mills and industry. These canals appear in approximately half of the documents considered in this research. Second, the other half of the documents concern sanitation, either in terms of street drainage and rainwater management or through household sanitation and domestic water supply.

Rather than count individual occurrences of words, the charts that follow are determined by actions, that is, whether or not a document was concerned with a particular infrastructure. It may mention the infrastructure a number of times within the document but it is counted only once as a single action. A single document might also deal with one or more forms of infrastructure, in which case, it is counted once per infrastructure type.

Bridges

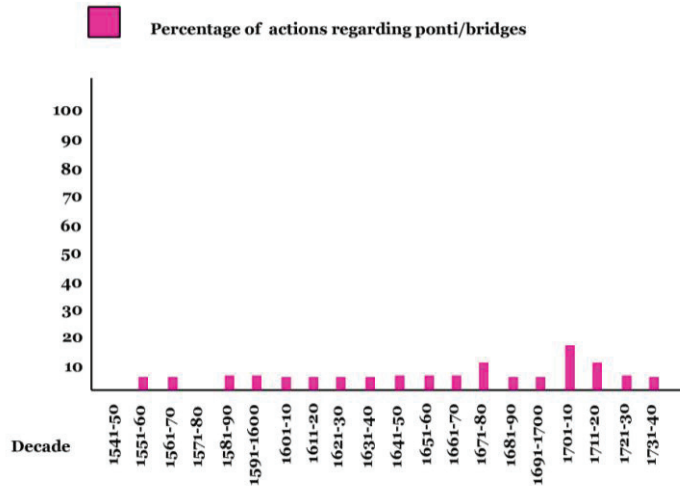


Figure 4-13: Percentage of actions that involved bridges.

The canals required a corresponding infrastructure of bridges throughout the city. Individuals could apply to build a bridge to facilitate their own travel in and out of their home or business. Other bridges appear to have been under the concern of organized consortia or overseen by millers but as with other infrastructure ultimately under the CSO. The key issue for the city with most bridges was the materials used to build them. It was often stipulated that the work needed to be done with materials such as brick or stone and good mortar as opposed to wooden structures. The increase in the number of bridges later in the Farnese reign could simply have been due to the need for infrastructure repairs and replacement as there is no indication that the city sought to upgrade overall bridge infrastructure as with the earlier street upgrades as evidenced in the chart below.

Street drainage and paving

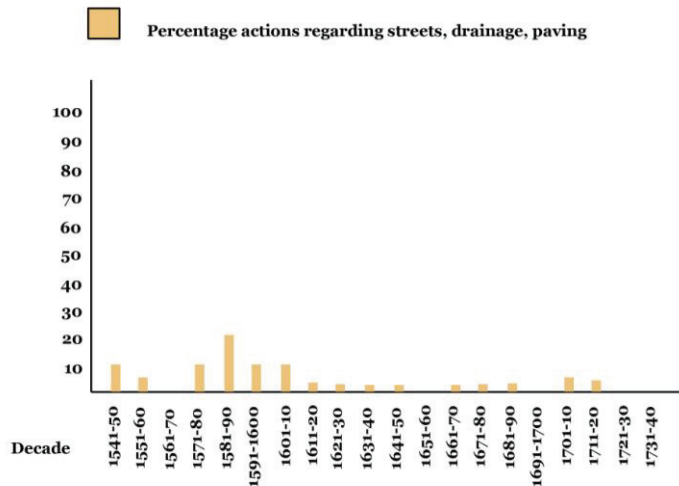


Figure 4-14: Percentage of actions that involved street drainage and paving.

The other main infrastructure, which was frequently mentioned, was for street water management. The city undertook a series of major street upgrades that began with Stradone Farnese, in the late 16th century, as there had been complaints about the lack of paving and drainage along this thoroughfare. Even Duke Ottavio complained in 1581 that the road named for his family did not reflect its glory²⁹. But a new goal emerged, to pave and repair the streets of the city and to provide drainage to the canals. In 1607 the city issued a request for all those in charge of the roads to send in, street by street, reports of the condition of the road infrastructure that included drains and drainage per householder³⁰. In a singular instance in the record, the street caretakers responded with lists of those living along their street and a description of the condition of their infrastructure. In essence, an inventory of street infrastructure was completed for the city³¹. This was followed by an increase in requests for licenses so that streets and

²⁹ CSO 3-F1-5.

³⁰ CSO 5-F3-15.

³¹ CSO 5-F3-15A, B and C.

drainage conduits could be brought into conformity with the city paving and drainage regulations³². For example, on 8 November 1607, Giovanni, the *massaro* for Santa Maria Tempio, handed in a three page list of names³³. Along with each name is a short assessment of the state of their infrastructure. Another list handed in on the same day by Daniello Bergamascho noted that several people along his street may have had brick or cobblestone paving but that much of it was broken. A list for the area of San Nazaro, in the city's second quarter, showed that many of the residents along the street had paving that included stone and cobblestone or brick, perhaps to provide a sidewalk. A list for Santa Brigida communicates that some people used pebbles, some cobblestone and pebbles, others just cobblestone, and a few others needed to do repairs. These lists covered the whole city and gave the committee a basis to make decisions to upgrade the street infrastructure. The committee did not issue another call for such a street-by-street assessment in this period. Instead the CSO dealt with instances of needed repair individually from this time on, especially problems that concerned street drainage.

Paving helped maintain the streets but drainage of rainwater was the critical issue for most people. In the winter, Piacenza received a number of rainy and wet days, as well as some snow. This water on the streets and in people's courtyards had to be collected and removed. Some of it drained into cisterns located beneath the street. Business owners and citizens applied to install their own drains near their storefronts or their courtyards connected to the local or area water channel.

³² CSO 5-F3-16.

³³ The term *massaro* appears to refer to men who had oversight of the condition of specific streets. The street survey shows that these *massari* covered the street infrastructure of the whole city.

Wells and cisterns

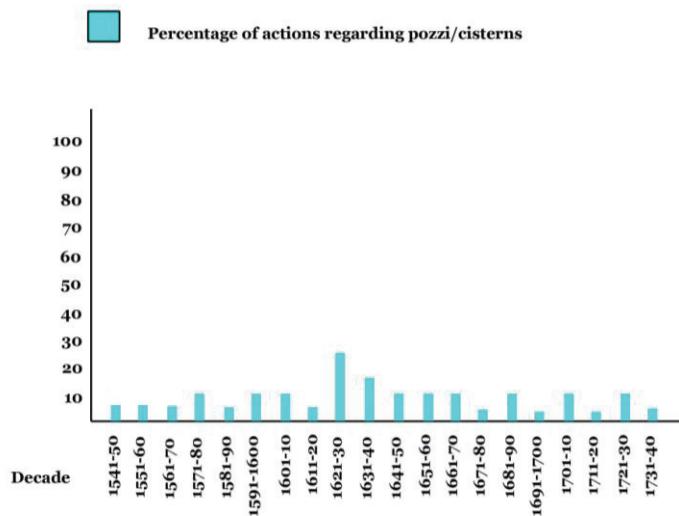


Figure 4-15: Percentage of actions that involved cisterns of all types.

The final infrastructure to be examined had the most impact on urban sanitation, the *pozzi* or wells and cisterns. *Pozzi* were often designated as a problem due to being filled or blocked with *immonditie*. This word can translate as rubbish, waste, litter, trash, refuse, and garbage or possibly even as sewage. From this designation alone, and even with the added description that a particular cistern is located in the street, it is impossible to know how many dealt exclusively with sewage. At least in some cases the street drain dealt with run-off from the meat market which would have included manure and offal. There is evidence of shared sewage cisterns located in the streets for easy access by cleaners.

Sanitation was an important issue for Italian cities. From the time of the 1348 plague, Italian cities developed measures to mitigate the severity of the various outbreaks and sicknesses that could sweep through an urban population. The medical theories of the day connected illness with bad odours, an obvious link to uncovered sewage canals and the manure and rotting vegetative matter that could be found in the streets. In his work on public health in the pre-industrial age, Carlo Cipolla notes that dirt and smells were of primary importance and concern to Italian health officials from the end of the Middle Ages. In the interest of population health management, urban officials exchanged

information on sewage, drains, cemeteries, and the health status of populations under their purview. In his examination of public health in Tuscany during the 16th and 17th centuries, he found that officials ordered trash and sewage removal from homes and streets. They dealt with cisterns and sewers and areas with stagnated water. Reports from sanitation officials complained of open sewers, too few cesspits, and a lack of maintenance of the sewage system. Cities then looked to experts to construct communal cesspits under streets and to install drainpipes in private homes. This is very similar to the system described in the Piacenza archives³⁴.

The CSO documents utilize a variety of terms to describe sanitation facilities and infrastructure. The most common is *pozzo* which means well or cistern. *Pozzo*, due to its general nature is frequently accompanied by a word to describe more specifically the type of well or cistern. In addition to the variety of wells or cisterns were other terms that describe sewers and cesspits (possibly a pit toilet).

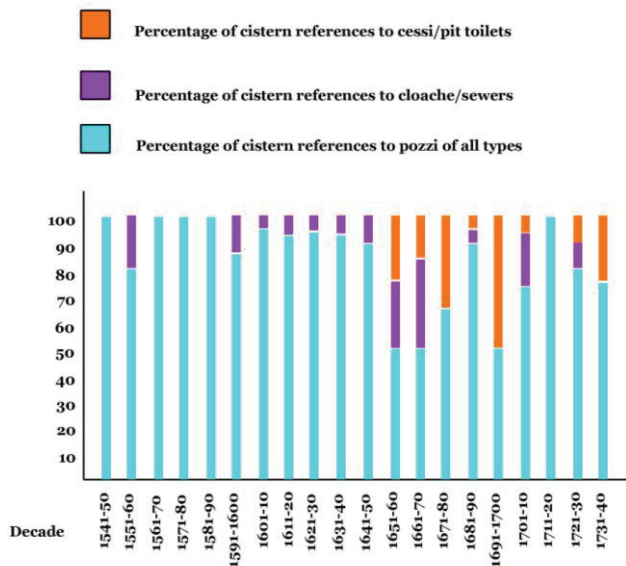


Figure 4-16: Percentage of uses of varied terms for sanitation facilities.

³⁴ Carlo Cipolla, Miasmas and disease, public health and the environment in the pre-industrial age, (London: Yale University Press, 1992) 7-18.

It is possible to see from figure 4-15 that wording shifted over time. *Pozzi* of all types remain common but the more precise terms for sewer (*cloache*) and cesspit or pit toilet (*cesso/cessi*) were added over time. It cannot be determined whether this was an evolution of infrastructure or simply a shift to more precise language. It can be seen that the modifiers for *pozzi* also became more common and more precise over time as well. None of this explains the actual construction of the cisterns but with the prevalence of brick in the area, and the standards frequently set by authorities for construction with brick and stone for conduits and drainage infrastructure, it is possible that at least some cisterns were lined.

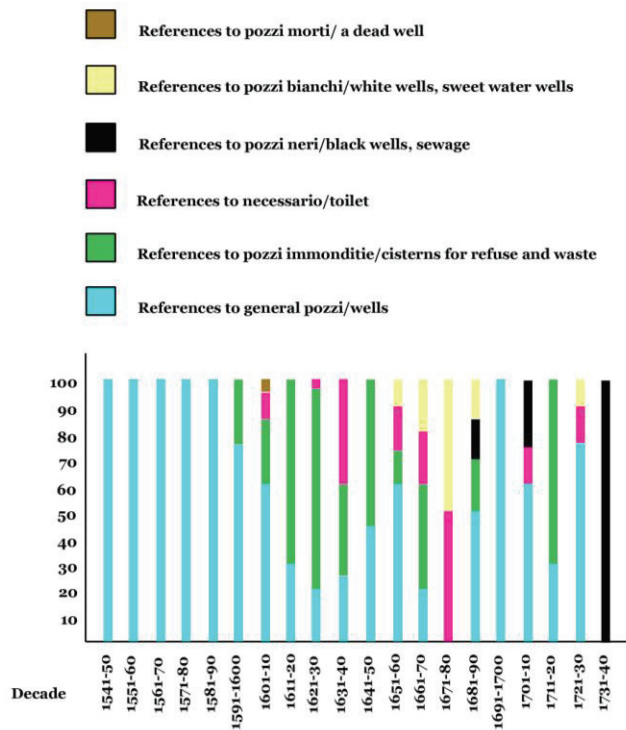


Figure 4-17: Percentage use of terms used to modify and describe wells and cisterns from total use of the word *pozzo*. The references to *pozzo necessario* or pit toilet of some sort escalate after the plague of 1630. Note there are references to white water wells which could have provided potable water.

4.2.3 Land use issues

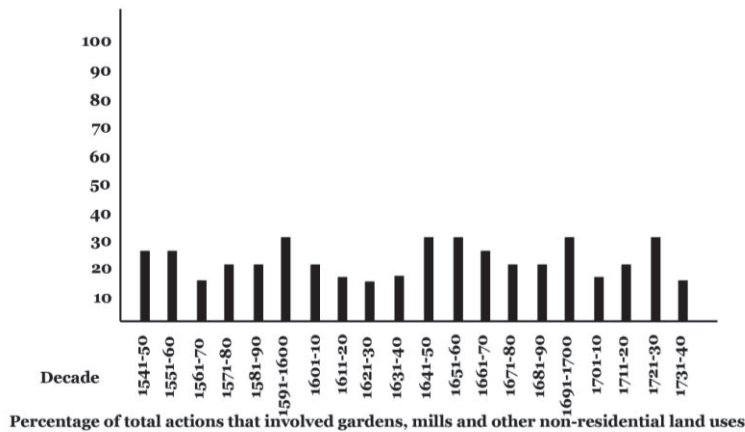


Figure 4-18: Total percentage of actions that involve the specific landuses of gardens of all types, mills and other industry.

From the beginning of the canal system in the countryside around Piacenza there was conflict between the use of water for irrigation and agriculture and its use for industrial purposes. Did similar issues exist within the city walls? There appears to have been significant urban farming inside the fortifications especially around the edges of the city. This space provided open areas for the garrison and access to the walls in case of an attack. Here, many of the monasteries and convents had gardens and small agricultural plots. The land outside the walls, also cleared for defensive sightlines, was farmed and used for food production. Likewise the city had numerous mills and artisans for several types of production with processes that required water. Issues that involved these various land uses figured significantly in the work of the committee. This analysis further examines land use and the potential for conflict between mills, urban farming, and the gardens of the nobles. Documents were checked for the occurrence of references to *molini*, *horti*, *giardini* and *filatoio*. Each document, no matter how many times a word was used within it, was counted as a single action.

Decade	Food gardens (<i>horto</i>)	Meadows (<i>prato</i>)	Ornamental gardens (<i>giardino</i>)	Mills (<i>molino</i>)	Industrial facilities (<i>filatoio</i>)
1541-50	3			4	
1551-60	9		2	7	1
1561-70	3		1	3	
1571-80	2				
1581-90	24	2	3	11	
1591-1600	21	1	8	10	
1601-10	21	1	9	25, including one named as the Duke's	
1611-20	12		4	18	
1621-30	13			36	
1631-40	4		2	25	
1641-50	20		2	62	
1651-60	10		7	33	
1661-70	14, including Duke's <i>orto</i>		5	15	
1671-80	10		6, including 2 mentions of ducal gardens	7	
1681-90	25		5	33	
1691-1700	11		2	8	1- <i>nuovo</i>
1701-10	2		1	10	
1711-20	19		4	8	
1721-30	8		2	12	1- <i>grande</i>
1731-40	5		1	5, including <i>molino tubatore</i>	

Table 4-4: Committee actions that involved varied land uses per decade.

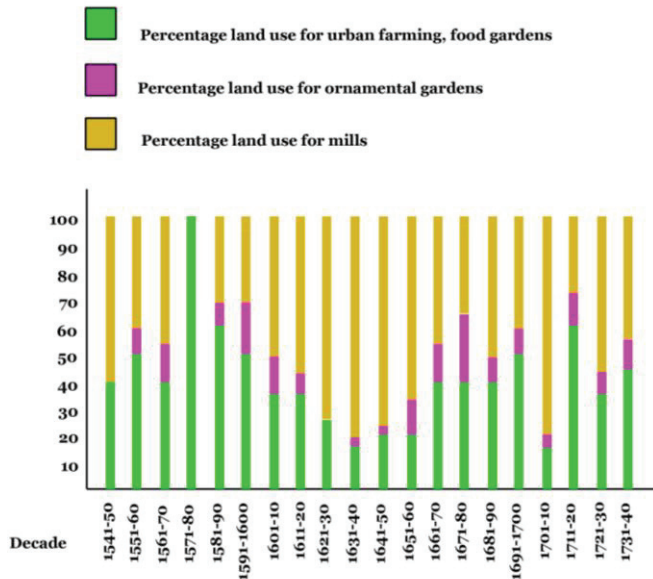


Figure 4-19: Percentage of actions divided between food gardens, ornamental gardens and mills in terms of land use.

Actions that primarily deal with mills appear to be in an inverse relationship with those that dealt with the many kitchen gardens of the city. One way to find indications of conflict between the two land-uses would be the number of documents that deal with both land-uses together. This number is very low per decade. Many decades have no documents that deal with both mills and urban gardens. The average is only 1.65 actions per decade overall. The single decade that stands out is 1641-50 with a total of five documents that mention both mills and urban farms and gardens.

Out of those five documents one is a 1641 letter, from a miller connected to the monastery Santo Spirito but it does not indicate any conflict over water use by an urban garden. Another from 1642 was a letter written by the Abbess of Santa Chiara convent which called for a purge of the Beverora from the canal entrance to the city near Porta San Raimondo to the smaller channel that ran to the convent. The letter commented on the involvement of a miller and gardeners. The last communication from that decade, which discusses both mills and kitchen gardens, was from a group of millers, concerned about the need to purge the Beverora in 1645. In their letter they included those in charge of food gardens in the list of people with some responsibility to clean the canal. The

significant exception for that decade is a case from 13 May 1642 where the court ruled in favour of a miller, who claimed damages due to a build-up of rubbish in the canal. The blame fell on the people who tended the food gardens and others who lived adjacent to the channel. The neighbours were ordered to do a clean-up on the waterway and to compensate the miller for damages³⁵. Over the years there were some conflicts and disputes between millers and those who managed the urban gardens but they seem rare. Problems appear to relate mainly to mismanagement of a water channel through neglect or laziness; problems that were not uncommon to the system overall. Perhaps because of how intertwined the land uses were within the city walls, it is not possible to single out a conflict between only two types of the several possibilities.

Mills

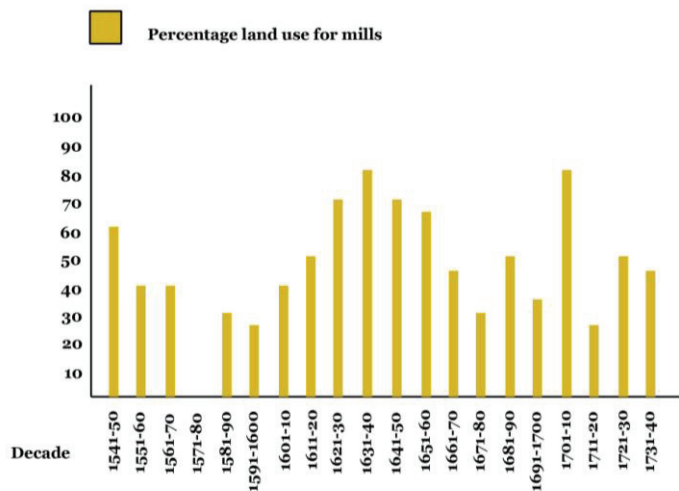


Figure 4-20: Percentage of land use actions that involved mills.

Of the total land use actions, issues that concern mills were generally prominent with a low of 0% in 1571-80 to a high of 78% in 1631-40 for an average of 47% of the

³⁵ In order of mention: CSO 14-F1-73, 14-F2-39, 11-F2-9, 14-F2-24.

examined land uses. This is to be expected. Mills were located in all sectors of the city along the watercourses. While often designed with a mill race that fed off of the canal and back into it, the action of the many mills would have had a large impact on how the watercourses functioned. Millers would have been one of the first to notice silt buildup that would have slowed down the water power to their wheels. Overall, millers were involved in many more actions and documents than those that address mills. They had authority within the system and responsibilities for how the canals functioned and were maintained. In this analysis, only documents that address mills as a land-use rather than those that call on millers as users and managers of the canals have been counted.

Food Production Sites

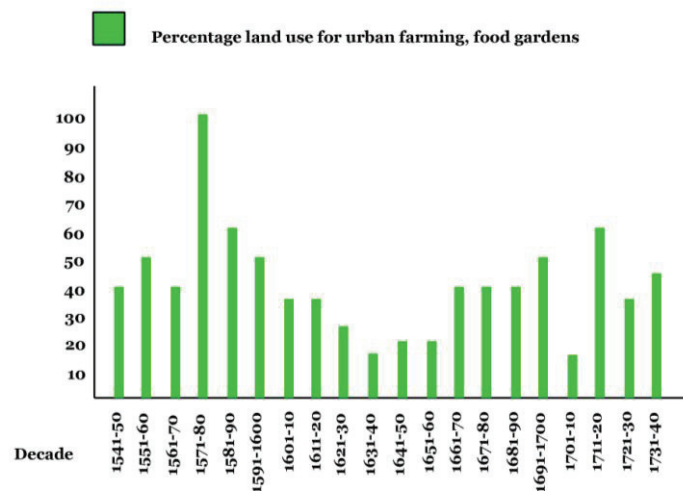


Figure 4-21: Percentage of land use actions that involved food gardens.

Urban food production within the city walls was important and was the focus of many actions within the committee. Often it was the source of complaints due to flooding. The shift downward in the number of actions during the 17th century may reflect resolution of land use issues that came out of the wall expansion and/or a decline of the importance of the urban gardens. Actions that involved food gardens alone ranged from 13% in 1631-40 to a high of 100% in 1571 – 80 for an overall average of 41% of examined land uses. Not

included in these figures were the meadows (*prati*) which appear only in the decades of 1581-90, two mentions, 1591-1600, three times; and a single mention in 1601-10³⁶.

Ornamental Gardens

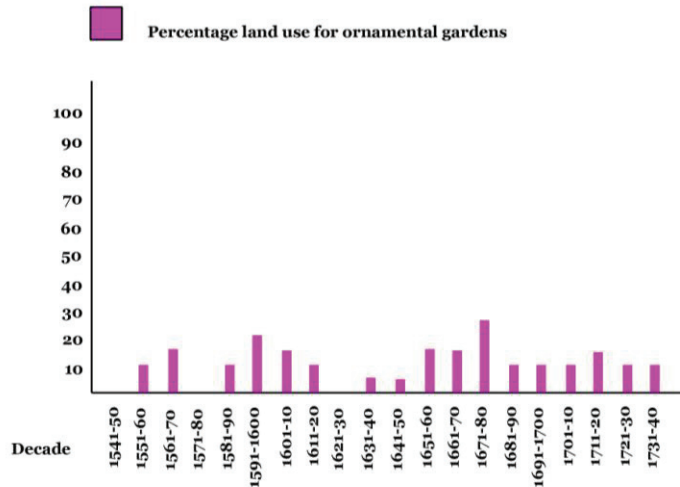


Figure 4-22: Percentage of land use actions that involved ornamental gardens.

One of the actions of the first Farnese duke was to require that feudal nobility reside in the city for a portion of each year. From the perspective of the duke, noble residences in town kept troublemakers under scrutiny. The nobles who lived in the city, at least part of the time, built large palaces with ornamental gardens. Many of those palaces were located on the south and western parts of the city, the water-rich areas. And despite the age-old spatial divisions within Piacenza, the palaces were distributed less by family name and more by available space as the city pushed outward and incorporated vacant land. Overall, ornamental gardens for nobles and church institutions account for 10% of the examined land-uses ranging from a low of zero percent in the decade of 1631-40 to a high of 26% in 1671-80.

There were a couple of anomalies that became important in the urban water administration. The Farnese family chose to locate its palaces on the north and east sides

³⁶ Documents that mention meadows (*prato*) are: A3-F1-1, 3-F3-12, 2-F4-11, 2-F4-12, 2-F5-1598, 5-F3-4.

of the city, along the north wall at the extreme downstream portion of the water utility, where building began in 1558 with the transformation of the Visconti fortress into the Palazzo Farnese. This *cittadella* had extensive gardens, which included food production, on the slope from the palace down to the Fodesta towards the Po River. By the mid 17th century the dowager duchess had her own residence next to the monastery San Lorenzo nearby on the extreme downstream end of the Meridiano canal, which carried away waste from the meat market. Both of these locations encountered water service problems specifically to do with polluted water supply through the gardens.

Other important land-uses in the record, though the number of actions involved is small, include four mentions of the *nuovo filatoio* (the new silk-spinning factory) in 1691-1700, and in 1721-30 there are four mentions of a *grande filatoio*, a ducal investment in industrial infrastructure. In the 200 years there is only one mention of domestic laundry use, found in the decade from 1601 to 1610. There is also the occasional mention of a *tintore* (a dyer) as a user of the water system in the decade of 1631-40 and 1651-60. And unlike other Italian cities with extensive public fountains there is only one instance of a fountain in these records. In February 1589 a license was issued that allowed a fountain within a private courtyard³⁷.

³⁷ CSO 3-F3-14.

4.3 CANALS IN THE CSO RECORDS

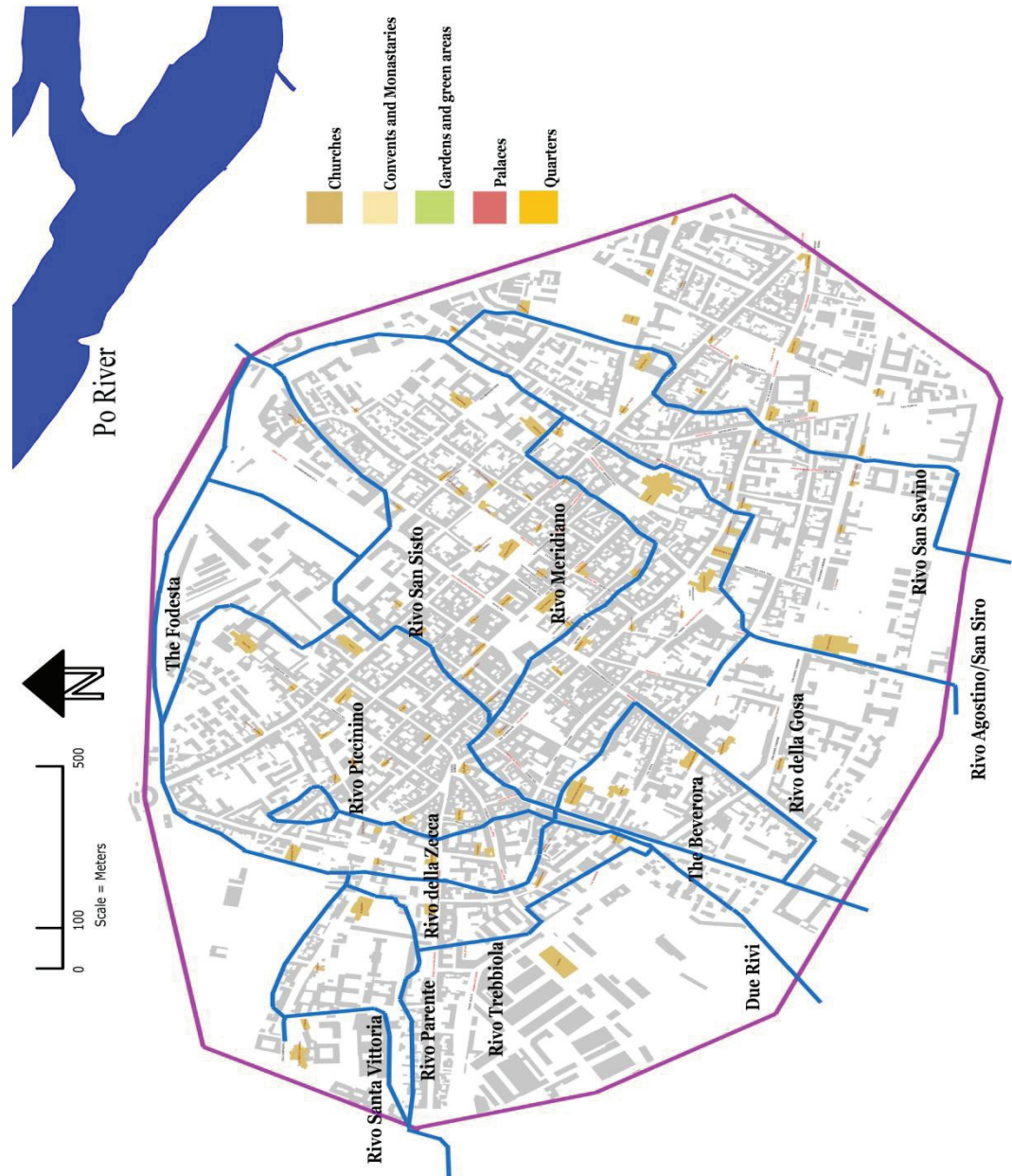


Figure 4-23: Map of canal system in Piacenza, main canals only.

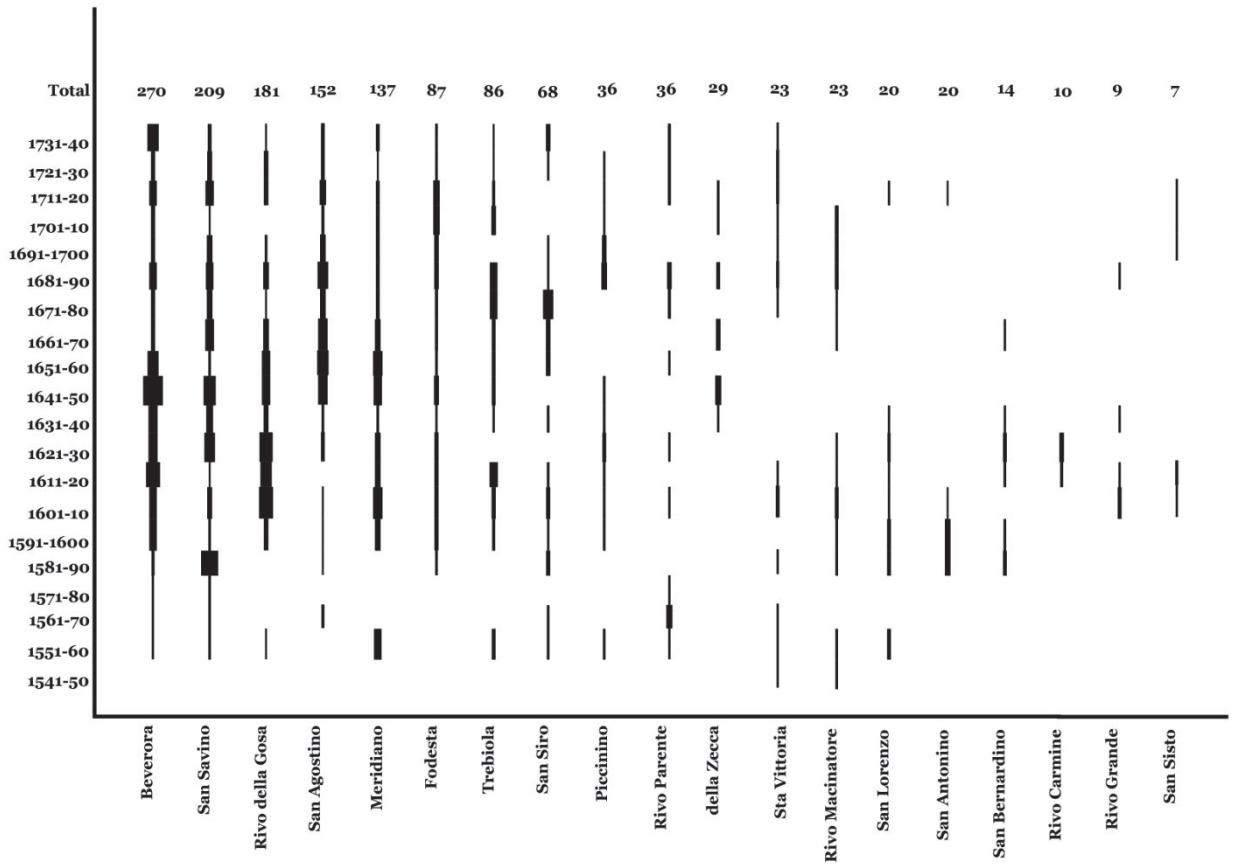


Figure 4-24: Chart of primary actions per canal per decade from CSO and AT documents. Note that Rivo Meridiano was constructed in the decade between 1550 and 1560.

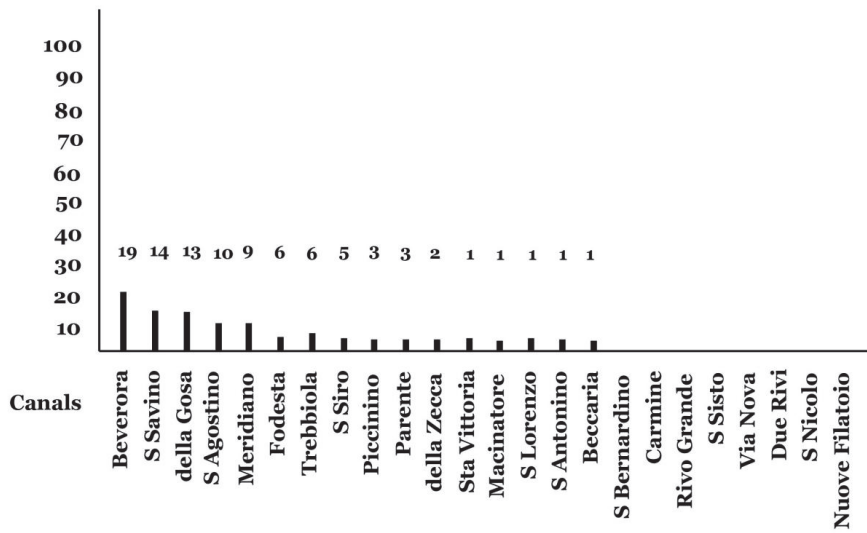


Figure 4-25: Percentage of total CSO actions per canal

An examination of actions that reference canals shows the wide range of focus for the committee. Figure 4-22 details the number of primary canal actions per canal within the archive. As each document was evaluated the canal mentioned in the document was counted as a primary action. In documents with multiple canals the first canal mentioned, or the canal indicated within the text as the most important one, was counted as an action. Other canals within this kind of document were counted as secondary actions. This method is admittedly imperfect, as it is impossible to always discern the intent of the document's author; however it does demonstrate how canals varied in their importance to the work of the committee.

Canals merited attention for different reasons. While both the Beverora and Rivo San Savino were large canals that through their divisions either directly or indirectly serviced much of the city, the third canal on the chart, Rivo della Gosa was not. It was an offshoot of the Beverora but seems to have had numerous maintenance problems, perhaps due to the way it was constructed or to its shape, with at least one 90 degree turn³⁸. Canals at the right end of the chart are frequently smaller divisions or channels and often required attention only for specific periods of time. What is most interesting is how often canals merited no mention in the records for years at a time. Is this a sign that day-to-day maintenance was managed without involvement of the committee or that the canals simply functioned so well they did not require attention all the time?

³⁸ Rivo della Gosa flowed east from the Beverora, took a 90 degree turn and flowed north along one of today's main streets, the Strada San Raimondo (Corso Emmanule II today), then, depending on whether you understand the name to change or not, it took a 90 degree turn to flow west and back to the Beverora. At times this latter section was termed Rivo Grande.

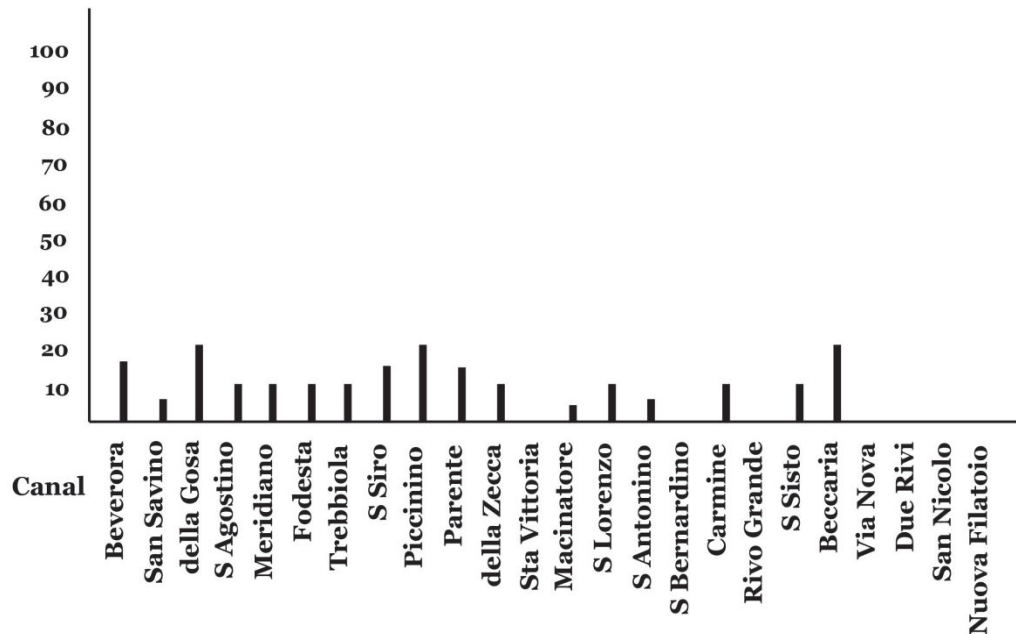


Figure 4-26: Percentage of actions that involve mention of a secondary canal or canals per primary canal.

Many times secondary canals are mentioned in a document. This chart shows the percentage of primary canal actions that included, per canal, mention of other canals. The inclusion of secondary canals does not always indicate a connection between the canals. Certainly in terms of Rivo della Gosa there are frequent secondary mentions of the Beverora from which it flowed out of and to which it returned. The Meridiano is similar. A problem with the Meridiano could be sourced back at times to its parent canal the Beverora. However, sometimes the urban administration issued a *grida* to the whole city, and after a discussion of the primary canal, it would go on in subsequent paragraphs to include other canals or other urban maintenance issues as if to make the document as comprehensive as possible.

The number of primary canals actions by decade are:

1541-1550:	10
1551-1560:	35
1561-1570:	20

1571-1580:	5
1581-1590:	72
1591-1600:	68
1601-1610:	123
1611-1620:	117
1621-1630:	121
1631-1640:	68
1641-1650:	169
1651-1660:	111
1661-1670:	89
1671-1680:	96
1681-1690:	132
1691-1700:	54
1701-1710:	44
1711-1720:	86
1721-1730:	41
1731-1740:	57

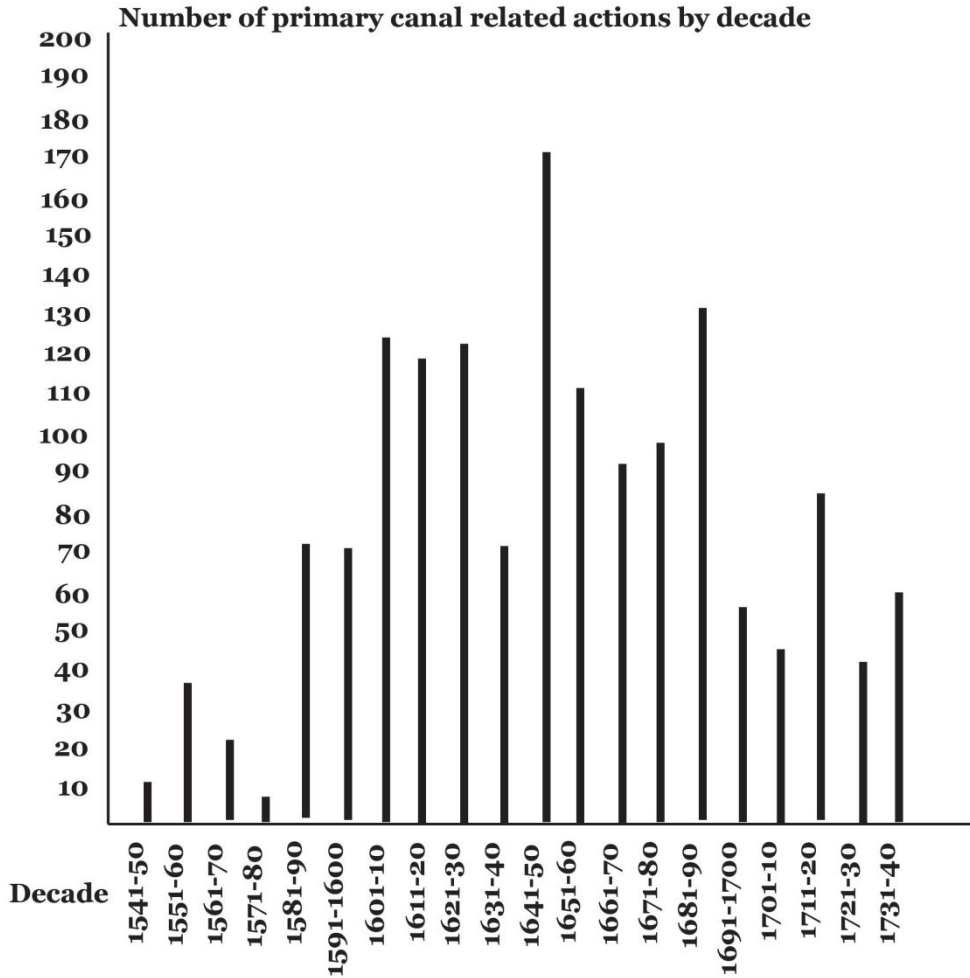


Figure 4-27: The absolute number of primary canal actions per decade by the committee.

Not unlike the overall thrust of all actions by the committee, those actions that involved primary canals increased during the 17th century, after the resolution of the conflict with the troublesome Landi management. However, despite an increase in overall actions during that time, the canals maintained a fairly constant share of the committee’s attention.

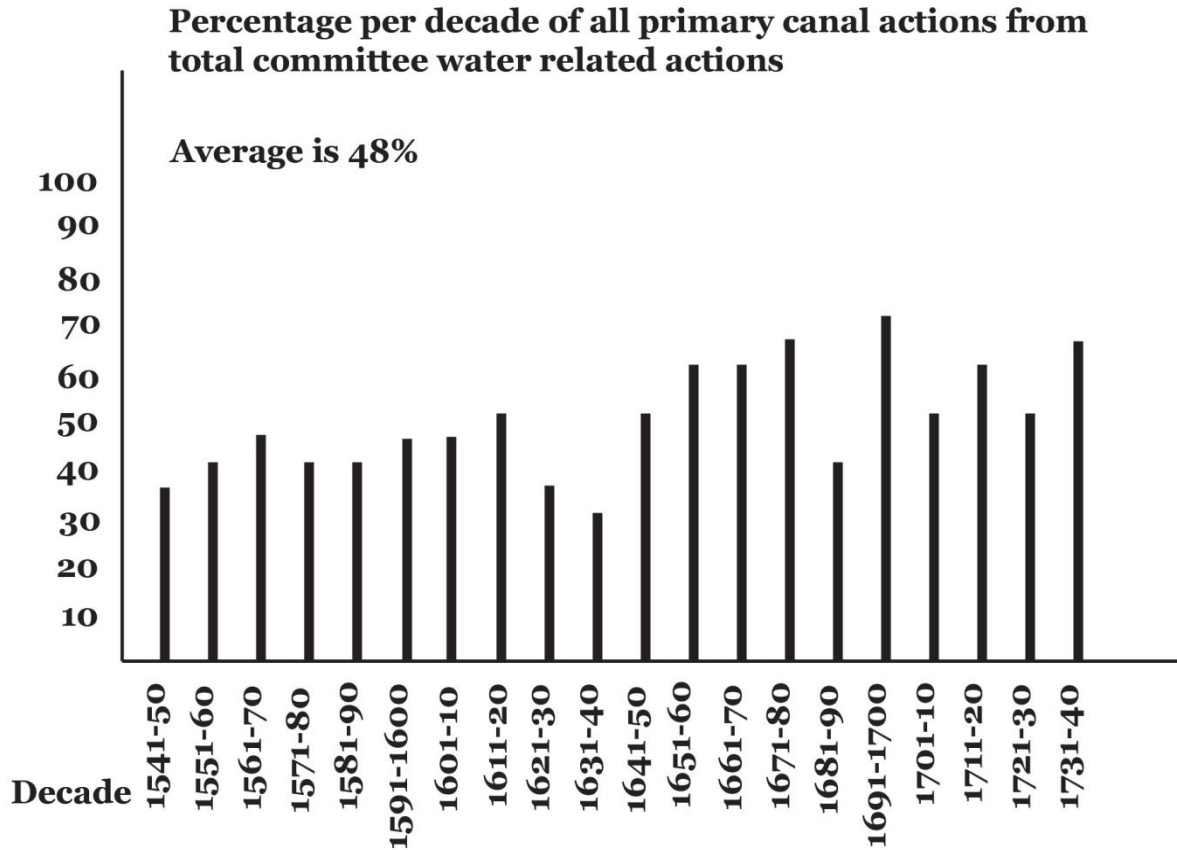


Figure 4-28: Percentage from total committee water action documents that involved canals per decade. Note: this means a canal was named in the document.

This chart shows that the canals required nearly the same percentage of committee actions per decade even after committee actions increased in the 17th century. While the system development of new channels demanded committee consideration, overall the canal administration was fairly stable.

Nevertheless the record per decade is quite uneven for specific canals under consideration. This could be due to the location and use of a particular canal that created higher levels of stress on the infrastructure. It is possible in some instances that the committee finally found an effective solution to the problem and could move on. Or perhaps problems were ignored at times and allowed to build up, which then required much more attention all at once. While most documents in the CSO stand alone as single statements of a problem, there are sequences of letters followed by orders, followed by

more letters with more orders that demonstrate that some problems were not easy to resolve and required several attempts to bring the work to a successful conclusion.

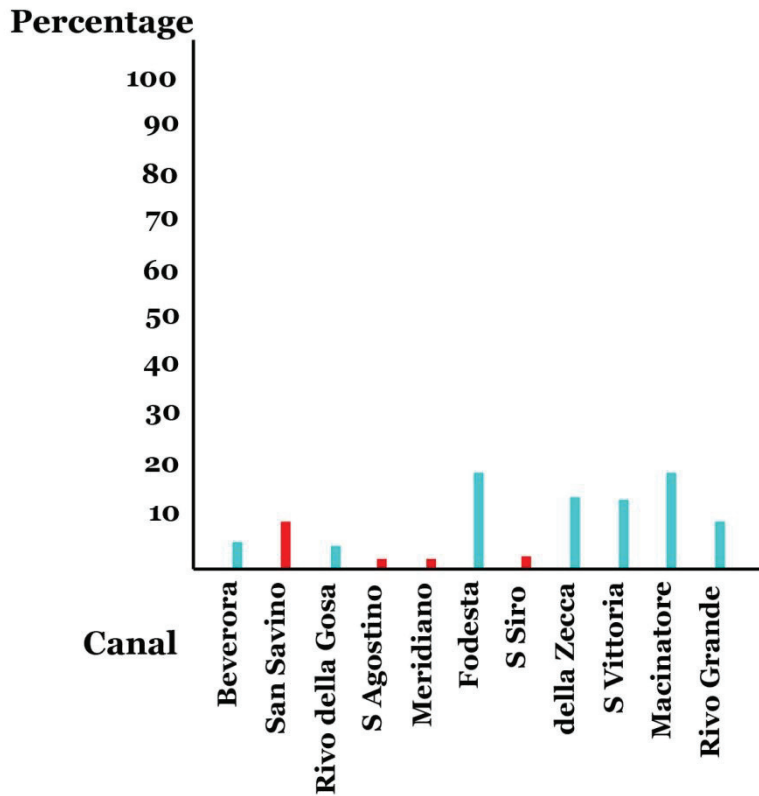


Figure 4-29: Bridge infrastructure per canal. Red lines are the south and east parts of the city, blue are bridges and canals in the north and west sections of the city.

Finally, the infrastructure of bridges varied widely between canals and sections of the city. The primary canal actions that include mention of bridge infrastructure are concentrated along the north and west sides of the city, the canal-rich side, as would be expected. Somewhat unexpectedly the Beverora did not dominate a discussion of bridges, which was left to other canals in that section of the city, the Rivo della Zecca, Santa Vittoria, the Macinatore and the Fodesta. The Fodesta, with its history of being navigable, was likely a wider canal and would make bridges more necessary with better and stronger construction. The canals like San Agostino, San Savino and the Meridiano ran through closely populated areas and frequently were channelled underground or through interior gardens for parts of their run.

4.3.1 Individual canals in order of decreasing number of actions in records

Rivo Beverora

The Rivo Beverora was a large waterway with a straight run through the west end of the city. It had numerous offshoots and serviced much of the west side of the city and beyond. It was possibly the original Rivo San Sisto or part of it. One of the smaller canals connecting to it during the Farnese years was known as the Rivo San Sisto and ran to the monastery of the same name. The Beverora is first mentioned in 1557 in the CSO documents and is included in a large number of documents due to its importance and the fact that it fed many of the smaller canals in the city. Today a road named Via Beverora follows the straight part of the canal from the west edge of the old walls to Piazza Borgo. The Rivo Beverora ran alongside the important Dominican convent of San Giovanni in Canale and both are often mentioned together in the documents.

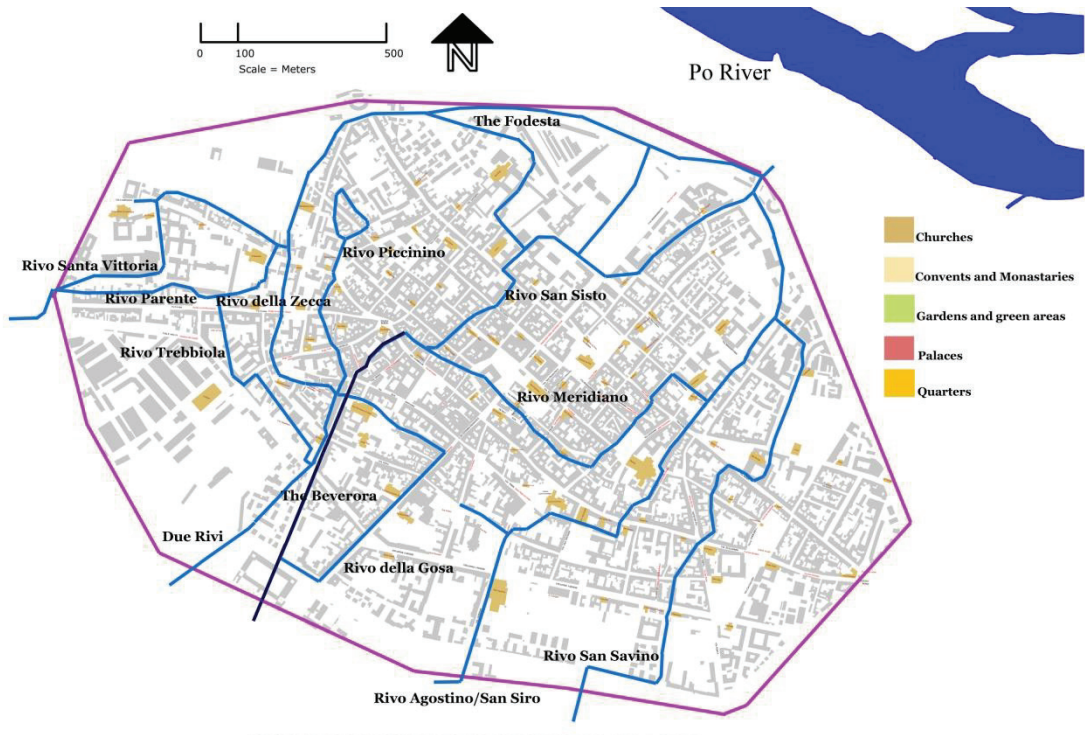


Figure 4-30: Map with Rivo Beverora highlighted.



Figure 4-31: The steps down from the street to the piazza in front of San Giovanni in Canale, summer 2010.

An interesting anomaly in the street is how the church San Giovanni in Canale is located significantly below Via Beverora. There is a flight of steps down from the road to a small piazza in front of the church. If this difference in levels has always existed it raises questions about the canal as it ran along the street. How did it relate in its infrastructure to the church building below it? The Rivo Beverora ran through to the south east side of Piazza Borgo where it divided further to feed other canals. An undated diagram of Rivo Beverora lists water amounts and conduits to: San Raimondo, Via Nova, San Giovanni, the Cantone di Sborzori, Santa Brigida, San Sisto, San Nicolo, Teodoro in Borgo, the Beccarie, the Ducal Camera, and one other (figures 4-49 and 4-50).



Figure 4-32: Piazza Borgo, with the church Santa Brigida to the right, fall 2010.

Rivo San Savino

The Rivo San Savino was originally constructed by the monastery San Savino and ran through agricultural fields outside the city walls on the east side of the city. It had its first record in the CSO in 1552, soon after the committee was set up. It too commanded much committee attention, sometimes due to the aged infrastructure. A major area of conflict that involved this canal was the boundary between the Capuchin monastery and the convent of San Bartolomeo Vecchio near where the canal entered the city. The two church institutions disputed canal management for many years.

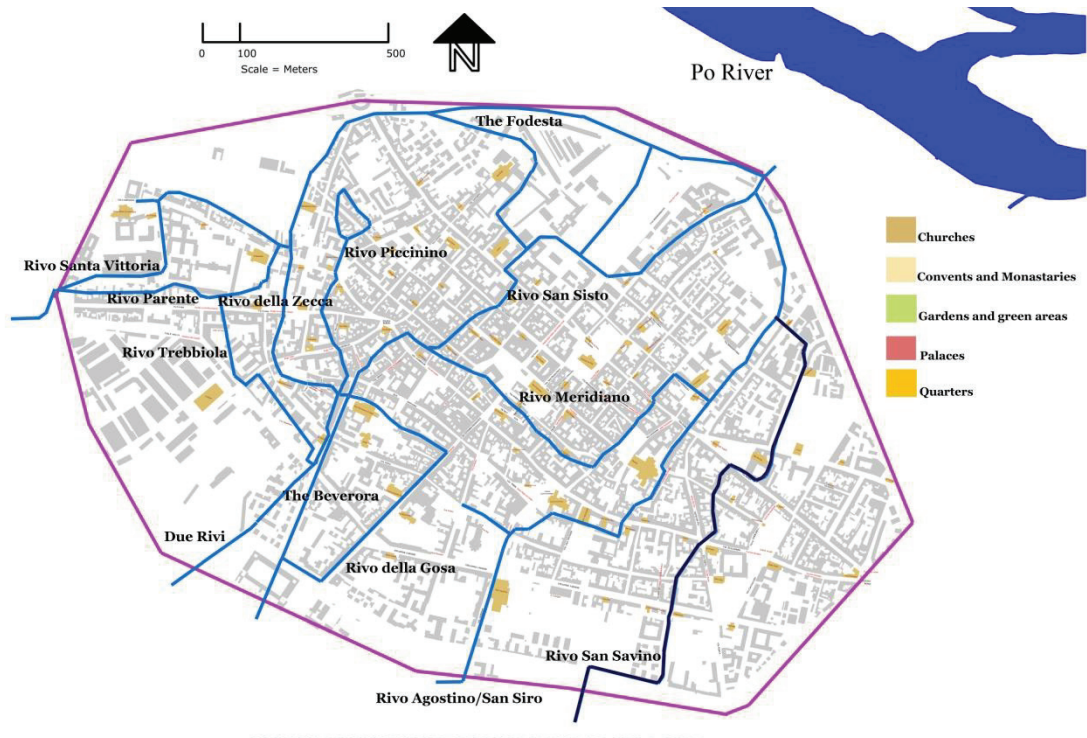


Figure 4-33: City map with Rivo San Savino highlighted.



Figure 4-34: Sunken area behind Capuchin church that might have been Rivo San Savino.



Figure 4-35: Tree and vegetation growth in area that indicates both the presence of water and the fact that it has been left alone.



Figure 4-36: The beginning of Via Canale (Canal Street) in Piacenza at Stradone Farnese, across from the Capuchin church. The street rises about a meter in a very short distance which means the topography has probably changed since the canal was buried.

Rivo della Gosa

The Rivo della Gosa ran down Strada San Raimondo (today Corso Vittorio Emmanuele II), a street of middle class artisans and shopkeepers as described by Giorgio

Fiori³⁹. It derived from the Beverora and looped back into it. This channel was a problem for the committee with continuous difficulties, complaints about flooding, silting, and loss of service. The canal is first mentioned in a record from 1569.

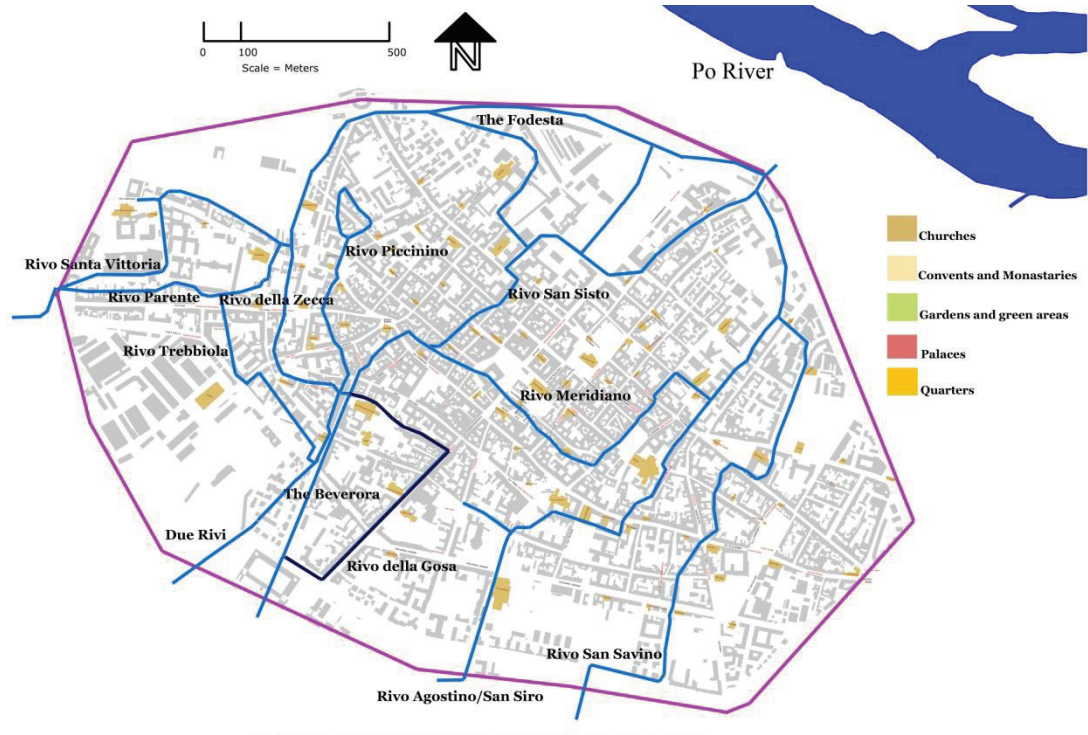


Figure 4-37: Map of canals with Rivo della Gosa highlighted.

Rivo San Agostino

The Rivo San Agostino appears to be a part of the older Rivo San Siro and the two names appear together on some maps. It ran alongside of the church San Agostino as it entered the city on the south wall. This great church and monastery was established during the Farnese reign in 1570 though it replaced an older church on the site. The canal of this name is first noted in the records in 1560 and appears to predate the church and monastery that were alongside of the canal. Was this simply a name change for Rivo San Siro or a new canal? A part of Rivo San Siro, by the time of Rivo San Agostino, split off and headed west. Rivo San Agostino ran to the east, and then turned north behind the

³⁹ Giorgio Fiori. Il centro storico di Piacenza. Palazzi, case, monumenti civili e religiosi. Tomo 3, (Piacenza: TEP,2005).

Duomo, connected with Rivo Meridiano, continued north to connect with Rivo San Savino and eventually the Fodesta. This might have been the original path of Rivo San Siro. Perhaps once the church San Agostino was built it was decided to rename one of the channels except that there appears to be a discrepancy between the establishment of the church and monastery and the early record of the canal by a decade. The discrepancy may simply be the time lag between when the church was initiated and when it was completed and consecrated. The confusion for the site alongside of San Agostino remains though, as some maps frequently show two canals that entered the city there and then one crossed over the other in a change of direction along Stradone Farnese. Such a manoeuvre would seem difficult in gravity-fed canals. Since this was a large canal it required a high number of committee interactions. Due to the name confusion some of the actions attributed to Rivo San Siro during the Farnese years may actually be part of the attention to San Agostino.

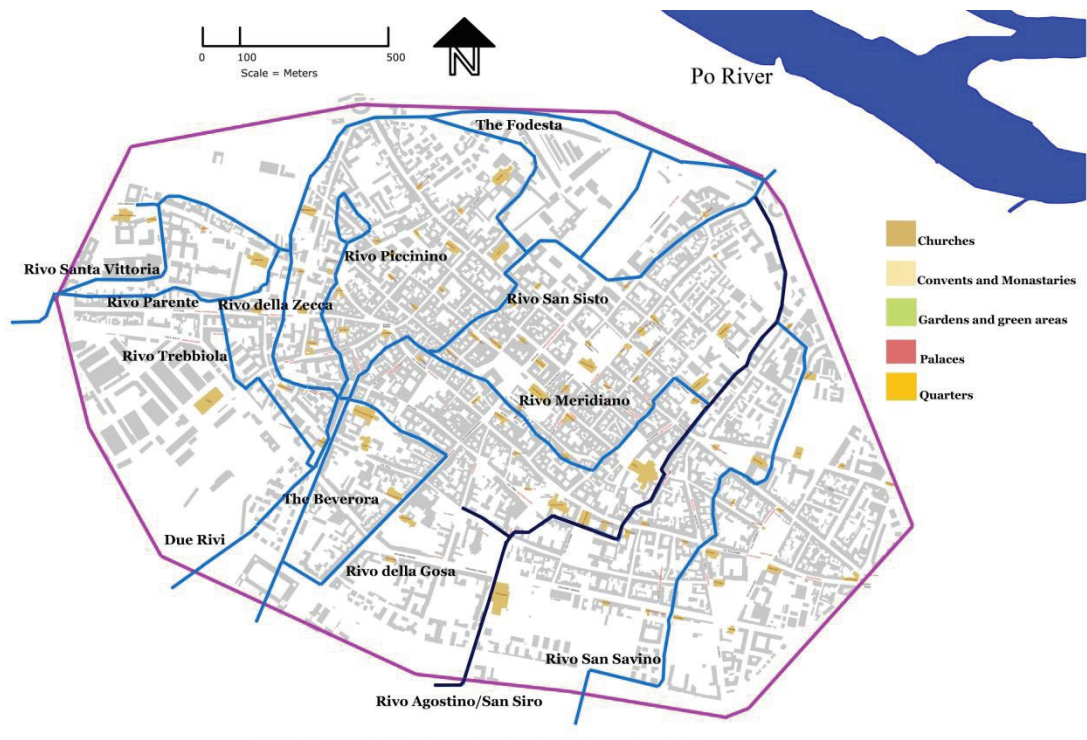


Figure 4-38: San Agostino and San Siro highlighted.



Figure 4-39: Alongside of San Agostino where the large Rivo San Agostino entered the city.

Rivo Meridiano

The Rivo Meridiano was a late offshoot of the Beverora, and it ran from west to east along the south edge of the old Roman walls. From the Beverora it ran east through the Gotico courtyard and into the meat market, down Via Sopramuro to Piazza del Duomo, where it turned north to run across Via Roma and out at the Fodesta. A reference to Rivo San Lorenzo inside the city walls may actually be Rivo Meridiano as it supplied the monastery San Lorenzo, which eventually included Palazzo Madama, the palace of the Farnese duchess that contained an important garden. This waterway had numerous problems principally due to its course which ran through the meat market located east of Piazza Grande. It is first mentioned in the collection in 1553.

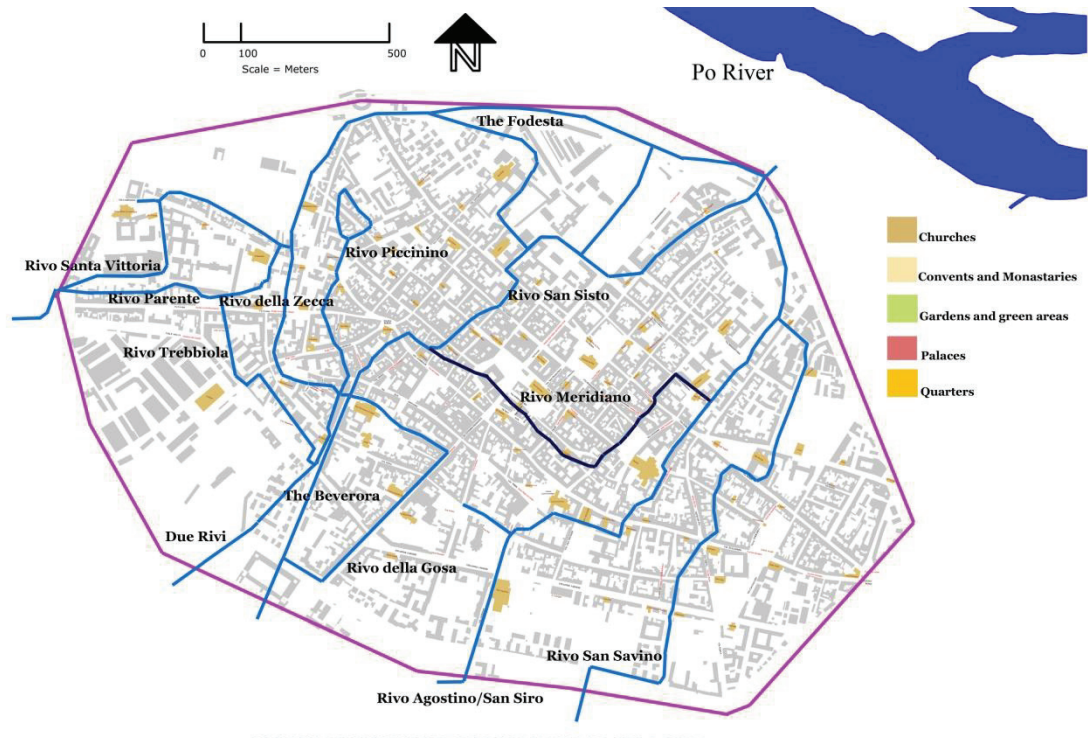


Figure 4-40: Rivo Meridiano from the Beverora to Rivo San Agostino.

The Fodesta

The Fodesta is an ancient navigable canal which ran along the west edge of the city built by the Romans. The last record of navigation on the Fodesta is from 1447 when the Sforza ruler from Milan sent boats down the canal. However, Pagliani comments in a footnote that by 1469 the city engineers had investigated the restoration of the canal so that it could be navigable again. Those efforts failed and the construction of Palazzo Farnese in the 16th century further disrupted the course of the Fodesta⁴⁰. It eventually ended up disconnected from its source and relegated to a collector before the exit at Porta Fodesta at the north end of the city. In the archival collection of the CSO its first date of mention is 1582.

⁴⁰ M.L. Pagliani, *Piacenza, Forma e Urbanistica, Citta Antiche in Italia*, (Roma: L'erma di Bretschneider, 1991), 78, footnote #228.

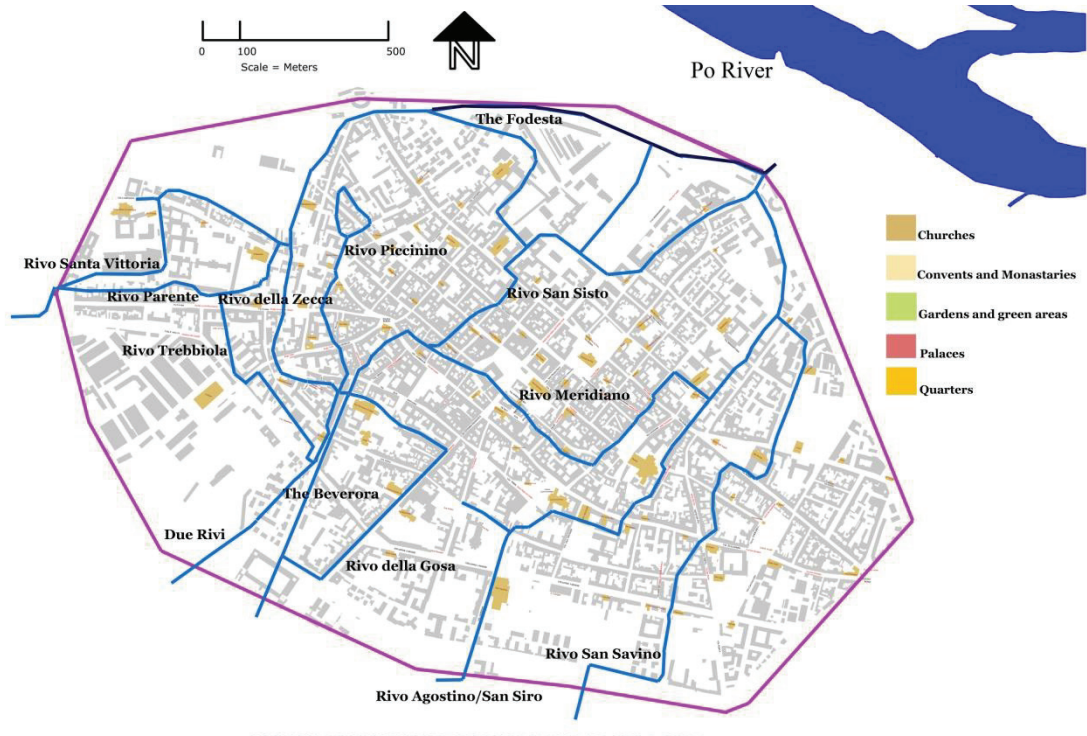


Figure 4-41: The Fodesta, in this view as truncated and disconnected from the mouth of the Trebbia. It became the collector for the canals as it ran along to its exit at Porta Fodesta.



Figure 4-42: Along the inside of the Farnese walls where the Fodesta was located. However, the Fodesta could have been just inside the walls now covered by the road, or further to the left in the picture, past the walkway, where the land sinks down behind San Sisto.

Rivo Trebbiola

The Rivo Trebbiola, a small canal, looped from the Beverora just north of the Farnese *castello*. It serviced the convents of Santa Maria Madalena and Santa Maria di Valverde before it connected with Rivo Parente. It is first mentioned in 1559. This canal should not be confused with the street named Via Trebbiola found in the southeastern part of the city.

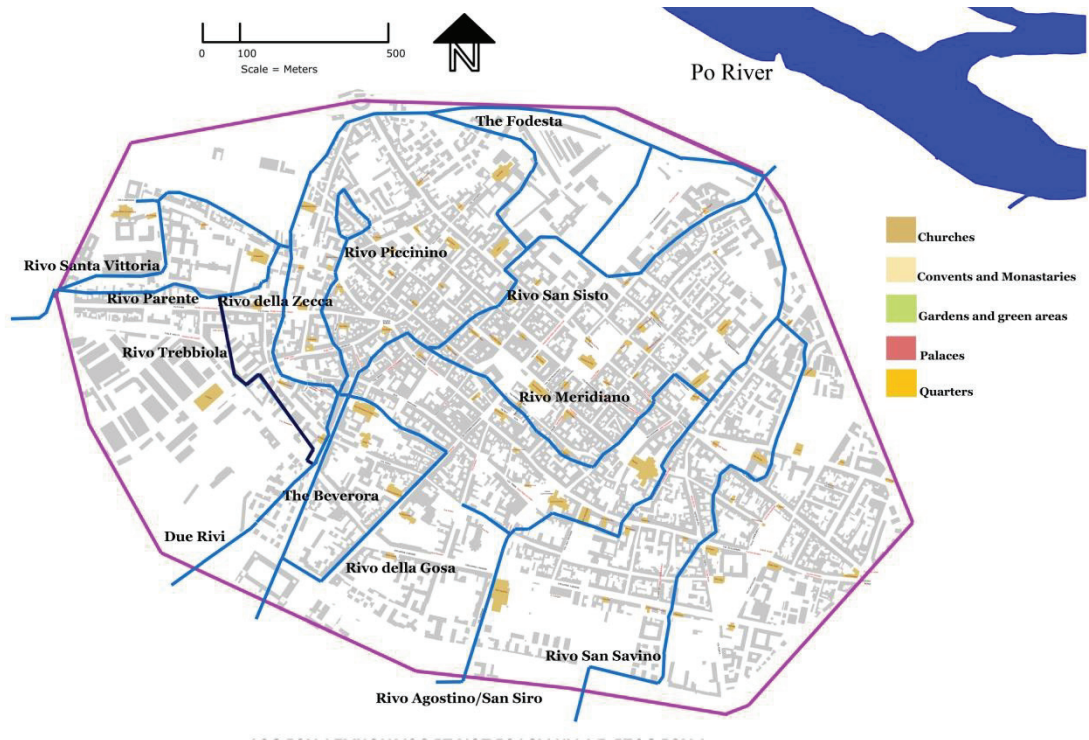


Figure 4-43: Map with Rivo Trebbiola highlighted.

Rivo San Siro (not mapped, see Rivo San Agostino)

As noted Rivo San Siro is one of the older canals and would have originally been outside the walls. It was presumably constructed by the convent San Siro to service its mills and gardens. Its first record in the committee is 1556. Rivo San Siro is often used in documents that appear to describe Rivo San Agostino. The names appear interchangeable in some documents. The canal was probably originally known as Rivo San Siro and then a name change occurred to Rivo San Agostino.

Rivo Piccinino

The urban Rivo Piccinino should not be confused with one of the two main city-owned canals that split at Colonna. This urban Rivo Piccinino was a small loop in the northwest part of the city, an area heavy with mills and artisans and prone to flooding from the Po River. It is first mentioned in the documents in 1555 in connection with a *filatoio*, a spinning factory.

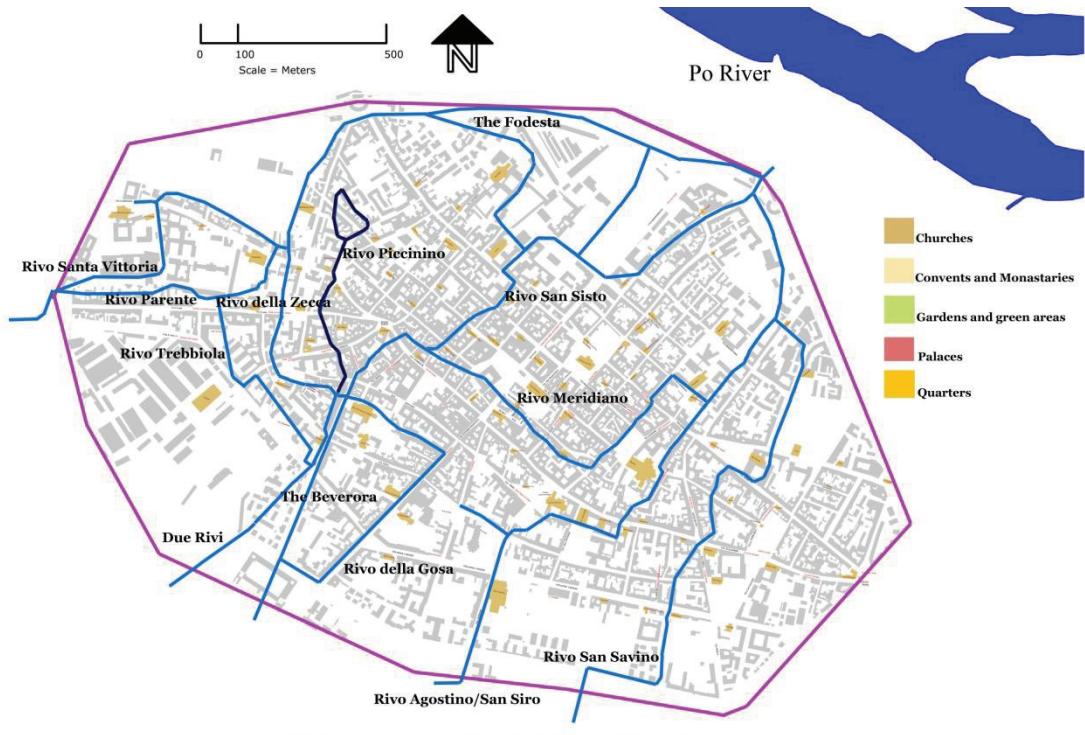


Figure 4-44: Rivo Piccinino (Piccinini). Not drawn on this map is a short canal that connected this to the Fodesta.

Rivo Parente

The Rivo Parente also has a shared name with a water channel in the countryside, though unlike Rivo Piccinino it is likely derived from its rural channel. Inside the city walls, it made a small loop in the northwest part of the city and connected to Rivo Santa Vittoria. It is first mentioned in 1553. It was important for the mills on that end of the city and serviced the large monastery and orphanage of San Sepolcro.

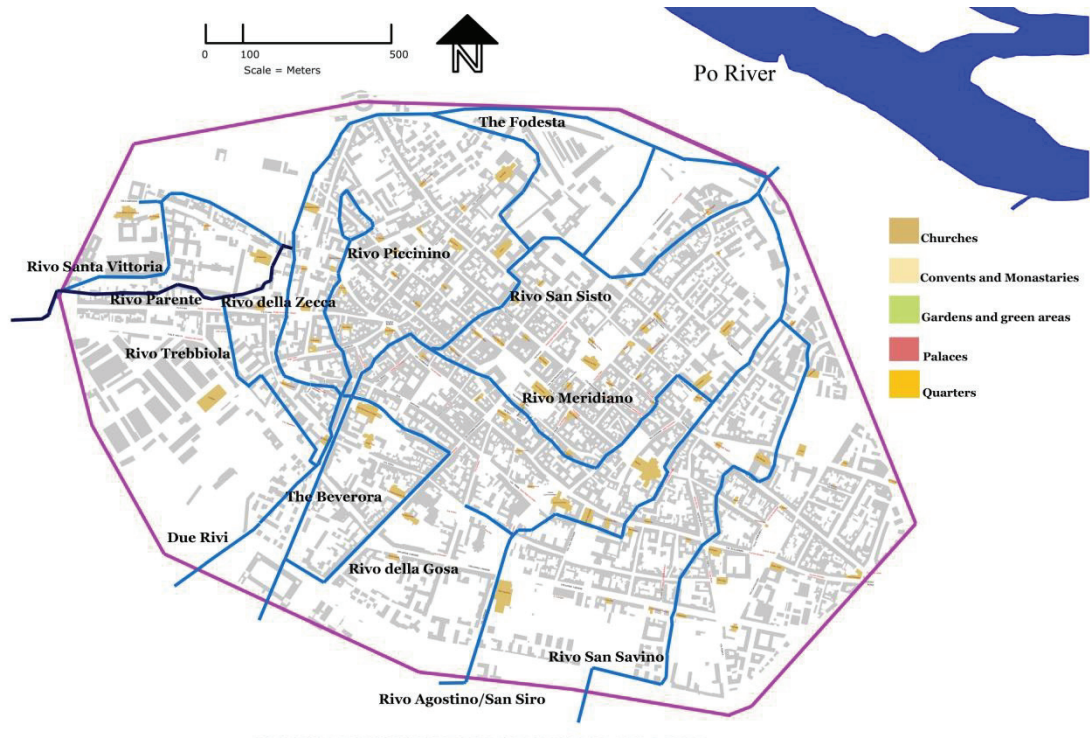


Figure 4-45: Rivo Parente highlighted.

Rivo della Zecca

In the 12th century the Emperor granted the city the right to mint coinage. Minting coins involved furnaces and metal that was annealed, pounded into strips, cut into squares and then rounds and finally stamped with a die that put the design on the coin. Such activity needed water for parts of the process so the city then dug a canal, the Rivo della

Zecca, to service the new mint⁴¹. This canal is an offshoot of the Beverora and is first mentioned in the CSO documents in 1640 because of a garden. While *zecca* means mint in Italian, the canal was also referred to as *cecha* and other similar spellings.

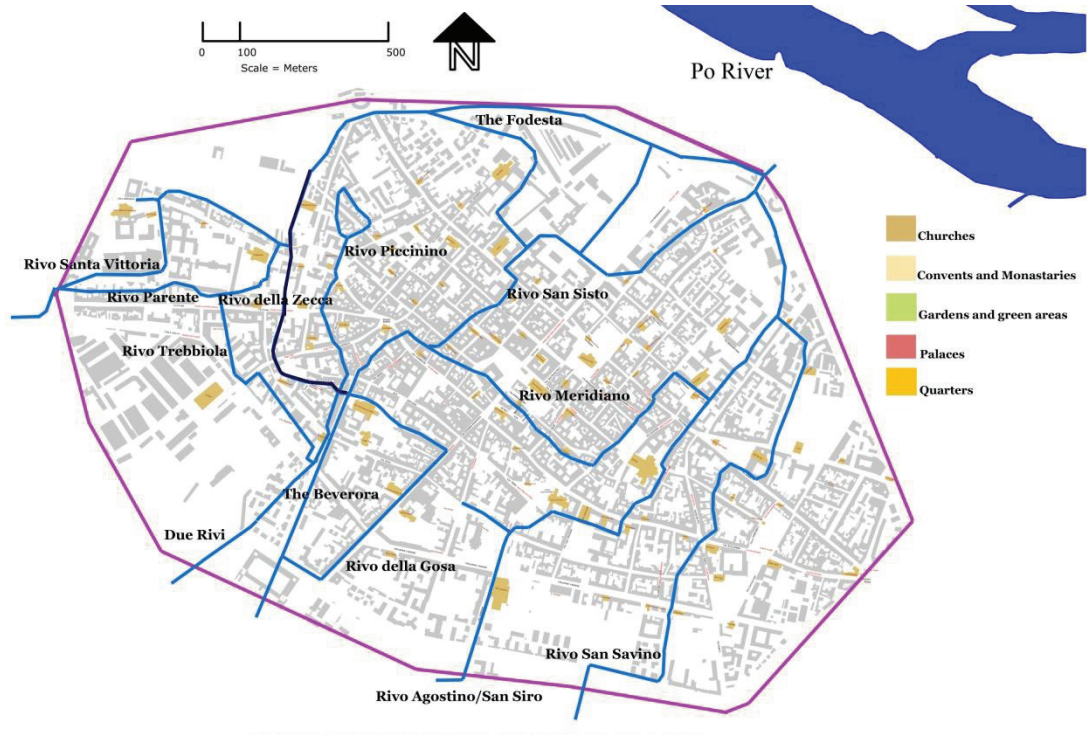


Figure 4-46: Rivo della Zecca from the Beverora to the Fodesta.

Rivo Santa Vittoria

The Rivo Santa Vittoria appears to be derived from Rivo Parente on the maps despite Vaciago's claim that it came from Rivo Piccinino, though her reference may be to another canal of the same name outside of the city walls⁴². Within the northwest quarter of the city, Rivo Santa Vittoria split from Rivo Parente and looped back to it before it going on to Rivo della Zecca. It is first mentioned in 1547 in the committee records.

⁴¹ Frank Anthony Carl Mantello and A. G. Rigg, Medieval Latin: An introduction and Bibliographical Guide, (USA: CUA Press, 1996), 492-495.

⁴² Giuseppina Vaciago, Il regime giuridico delle acque di Trebbia nella storia, tesi di laurea in Giurisprudenza, Facolta di Giurisprudenza, (Piacenza: Università Cattolica Sacro Cuore, 1957/58), 36.

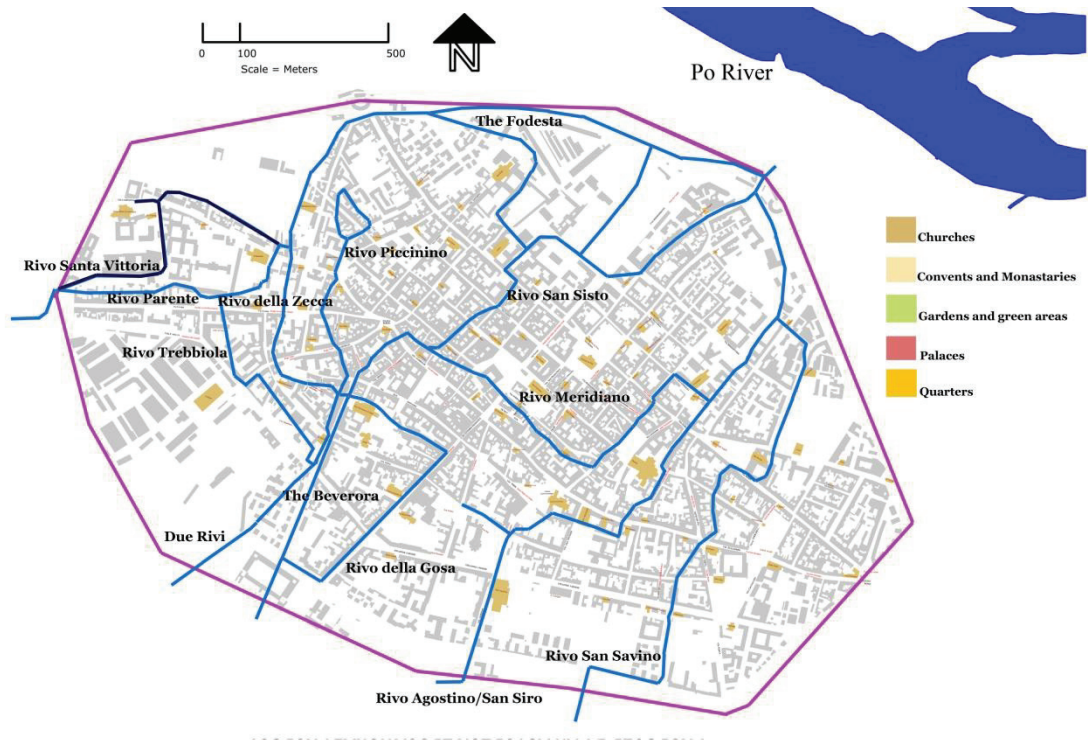


Figure 4-47: Rivo Santa Vittoria as it derived from Rivo Parente.



Figure 4-48: Sunken orchard formerly watered by Rivo Santa Vittoria, part of the garden for Santa Maria in Campagna.



Figure 4-49: Sign for garden park with an explanation of the canal system that supplied the city.

The Macinatore (not mapped)

While most of the canals within the city serviced urban grain mills, and were often known collectively as *macinatore*, one urban canal was designated specifically as the *Macinatore*, and was referred to that way in the documents. Yet, maps do not contain a canal with this name. It may have been an informal designation for one of the other canals that ran through the industrial section of the city in the northwest. The locations associated with the documents that cover this canal are not consistent. The most consistent references are to the monastery Spirito Santo. If what is generally referred to as Rivo Macinatore in the committee documents is the canal that ran alongside this monastery, then it is really another name for Rivo Piccinino⁴³. The two engineer's reports from 1702 and 1709 would be the most definitive in the location of the canal, as they tend to be specific and detailed. It is one of the first-named canals that the committee dealt with, as it is mentioned in 1547, the year the committee was formed⁴⁴.

Rivo San Lorenzo (not mapped)

The Rivo San Lorenzo may have been an offshoot of the Meridiano and referred to the section of the channel that travelled through the monastery San Lorenzo. It assumed more importance when the Farnese duchess built a garden alongside of the monastery, as the garden was downstream of the pollution from the meat market. It is first noted in the documents in 1551.

Rivo San Antonino (not mapped)

It is difficult to be certain about the Rivo San Antonino. It may be a portion of the old Rivo San Siro/San Agostino that flowed through the piazza San Antonino or it may have been a smaller offshoot of Rivo San Agostino not normally mapped. It first appears in the records in 1587.

⁴³ CSO 18-F1702-32, the report by Bartolomeo Cremonesi, 18-F1709-22A, a license granted to Spirito Santo to build a bridge over the canal, and 18-F1709-22B, the engineer's report on the proposed bridge by Giuseppe Cremonese.

⁴⁴ Note that *macinatore* was a general designation for a canal that serviced mills as opposed to those for irrigation in the countryside.

Rivo San Bernardino (not mapped)

The Rivo San Bernardino is possibly another small offshoot along Stradone Farnese near the convent San Bernardino. It is first noted in 1585.

Rivo Carmine (not mapped)

The Rivo Carmine was derived from Rivo San Sisto and fed the Carmine convent. Most of the references to it have to do with service to the convent. Records for it run only from 1612 to 1627.

Rivo Grande (not mapped)

This term is used frequently in connection with Rivo della Gosa and raises some puzzlement. On some maps Rivo della Gosa ran off of the Beverora and back into it. The term Rivo Grande may refer to a portion of Rivo della Gosa, particularly the portion that ran west from Strada San Raimondo back to the Beverora, or be a reference to the large Beverora canal. It merits only a few mentions in the records from 1605 to 1681.

Rivo San Sisto

During the Farnese years and while under the work of the CSO, this term referenced a smaller offshoot of the Beverora, which was possibly the lower portion of an older canal with the same name. It is first mentioned in 1605.

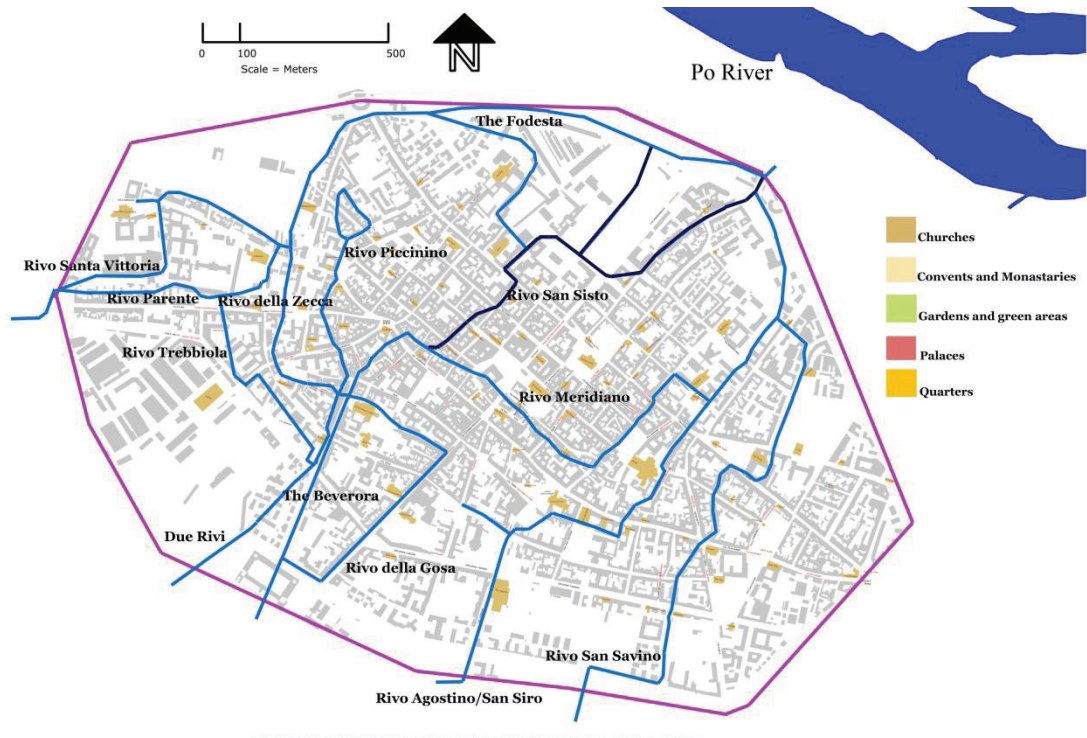


Figure 4-50: Rivo San Sisto highlighted to its service to the monastery and the connection with the channel that serviced the ducal cittadella (the lower right channel).

The Due Rivi

The Due Rivi waterway entered the city just west of the Beverora on the south wall. It divided into the Rivo Trebbiola and possibly also fed into Rivo della Zecca. The second part of this channel was Rivo Piccinino inside the walls. On the maps this is the part of the city where the canals run into and out of one another and without details it is impossible to really know which canals fed into one another, their names, and their importance. The Due Rivi gained first mention in the archive in 1609 but merited only 3 actions by the committee until 1736.

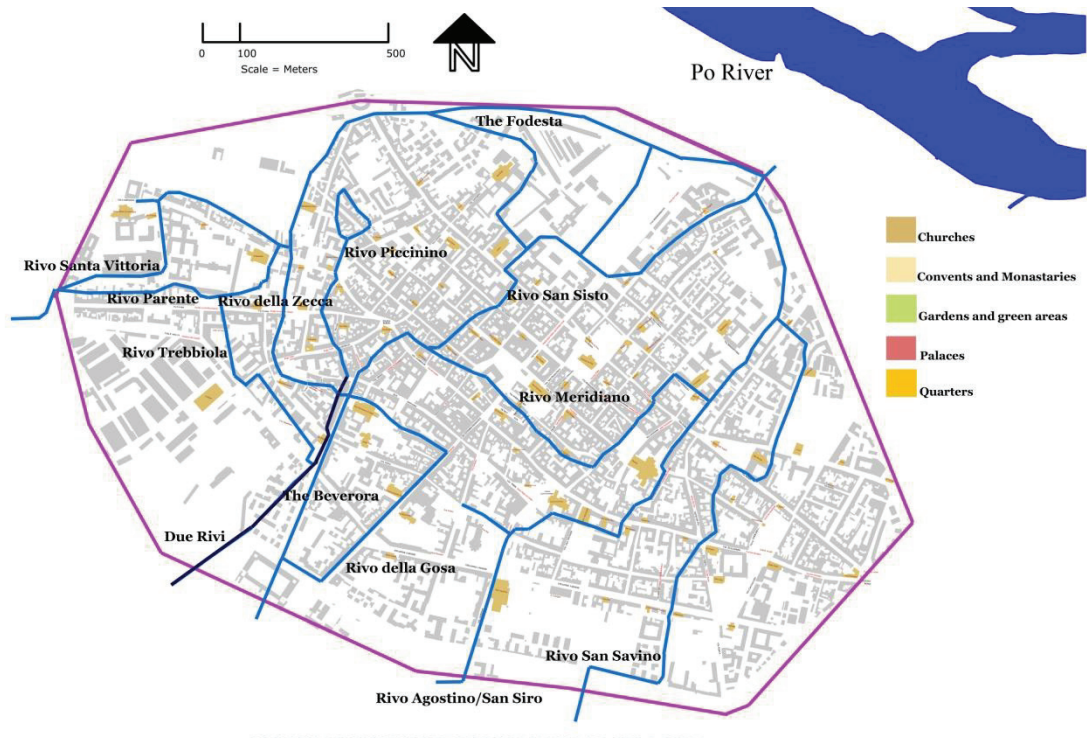


Figure 4-51: The canal known as Due Rivi and its entrance into the city.

The documents reference canals by other names, which may be older or alternative names for major canals or names for smaller, more local channels. These names include: Rivo San Stefano, Rivo San Bernardo, Rivo ViaNova, Rivo San Nicolo, Rivo San Donino, Rivo Beccarie, Rivo Castello and Rivo Nuovo Filatoio. These names tend to occur infrequently in the records. While the smaller channels remain invisible on the maps they were critical to how the city functioned. It was through the smaller canals and waterways that institutions were able to connect to the larger system and receive water service. Underneath the large canal system as mapped in this work there lays another layer of smaller, often shorter, conduits and connections that enabled the utility to work for the inhabitants.

Rivo Beccarie and the meat market

One point of uncertainty is the location of the meat market(s) and the abattoir. There was a small channel off of the Beverora designated as Rivo Beccarie although it is not mapped further into the city. A search for designated locations affiliated with references to such a named waterway yields a division in the location. Out of a total of 15 references to the canal two place the canal so named near Santa Brigida and San Nicolo. This would support the understanding of the location of the channel as derived from the Beverora though it would have remained a short conduit to a nearby meat market. Two more records further support this as they give secondary canal references for the Beverora for a total of four documents that site the Rivo Beccarie in the west end of the city. But two documents place the canal at the church of San Donino, just south of Piazza Grande and one uses Rivo San Antonino as a secondary canal reference. These would move Rivo Beccarie and the meat market it served further east in the city and site it in the heart of the commercial area. Documents that deal with Rivo Meridiano also refer to the meat market and locate it in that area. An engineer's report by Giuseppe Cremonese dated 10 May 1696 described the request of a local entrepreneur for a license to build a drain in his basement to connect into the Rivo that is called the Beccarie for the purpose of making *acquavite*⁴⁵. He located this near the church of San Donino and the church of San Francesco which put it squarely on the east side of the Piazza Grande. But in the license granted to this entrepreneur the canal reference is changed to Rivo Meridiano⁴⁶.

One clue may be found in a diagram of the Beverora. Rarely do maps of the time include all the numerous smaller water channels that eventually came to network across the city. Few were mapped, but the Beverora was occasionally diagrammed to include smaller divisions. Part of this may have been the fact that one or more of its divisions,

⁴⁵ This raises the possibility of the canals providing potable drinking water. Water used in *acquavite* production would ultimately have been boiled and cleansed in the process of producing the spirits. It is equally possible that the request for a drain and connection to the canal was to facilitate disposal of the waste from the production of the alcohol. The engineer's report and the description in the licence do not make clear how the connection to the canal was to be used.

⁴⁶ CSO 17-F1694-26, and 17-F1694-26A.

Rivo Meridiano and the so called Rivo Beccarie, dealt with the meat market(s). The place(s) where animals were butchered and the meat sold was a source of frequent complaints about water service and pollution downstream. The repeated attention demanded by these areas may well have spurred a more detailed and comprehensive level of management. The sheer complexity of allotting water to many different users would have required more detailed diagrams and mapping. On this diagram there is no Rivo Meridiano, but there is a Rivo Beccarie. Could the two names refer to the same water channel and serve a single meat market? Another clue is found in a letter in CSO busta 9. The writer, a tenant who oversaw the duke's garden, in a complaint about rubbish and filth in his water supply, stated that the canal for the *beccarie* is called Meridiano⁴⁷.

As Zilocchi explains there were actually two locations for the meat market during the Farnese years. The first, an older location was near Piazza del Borgo and the church of San Giorgio. Then, in an effort to increase their control over the market management, pricing and ongoing fraud, the municipal authorities moved the market into a new building in the centre of the city, across the street from the church of San Donino and behind the Gotico. The Rivo Meridiano was dug to service the new meat market location between 1553 and 1556. This large scale municipal building project was accomplished while the city was under Spanish rule from Milan and between Farnese dukes⁴⁸. This explains the split in location between early and later documents that reference the *beccarie* to the east near Piazza Borgo and later near San Donino and Piazza Grande.

⁴⁷ CSO, 9-F2-55, “il rivo delli Becharie chiamato Merdano o sia Meridiano in modo”

⁴⁸ Cesare Zilocchi, I Tormenti della Carne, beccaj, beccarie, macelli a Piacenza, (Piacenza, TEP Edizioni d'arte, 1993), 30.

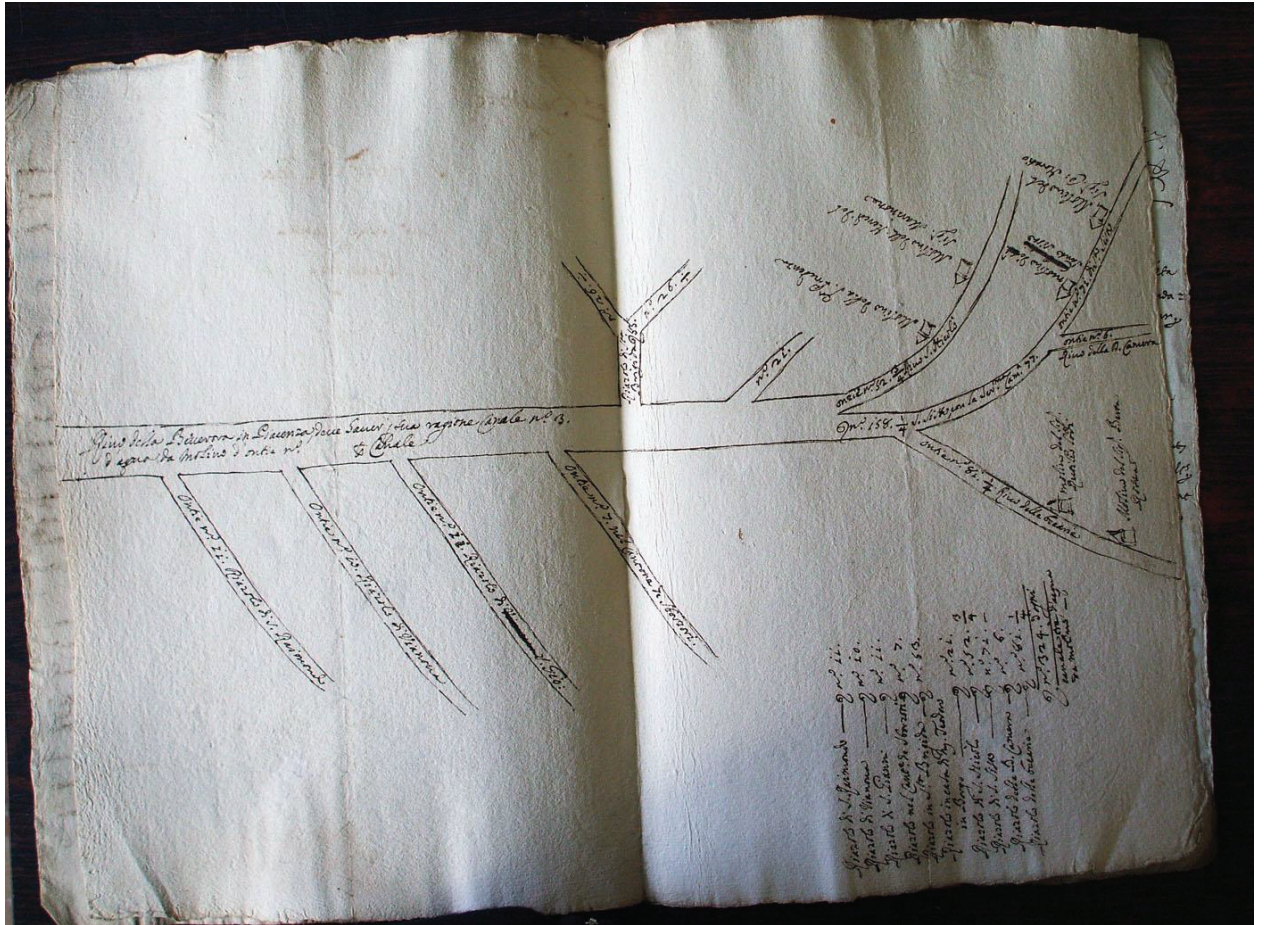


Figure 4-52: Diagram of the Beverora with smaller canals and their allotted flow amounts. This diagram does not include a Rivo Meridiano which raises the possibility that Rivo Beccarie and Rivo Meridiano are the same. AT, busta 12.

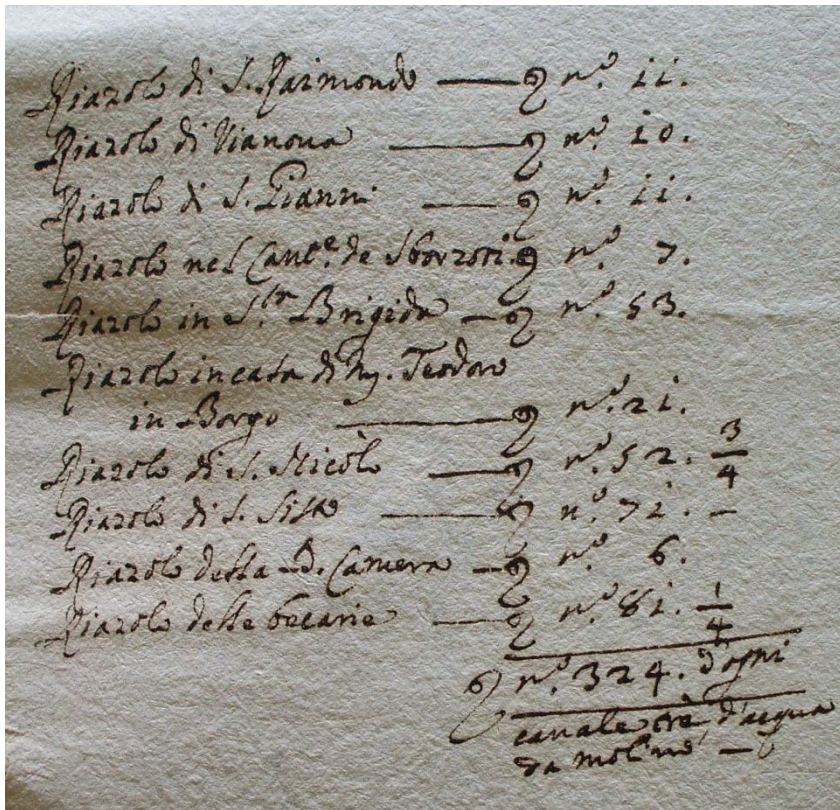


Figure 4-53: Detail from diagram above that names smaller canals that ran from the Beverora. AT, busta 12.

Inside the walls, all the canals joined together to flow out of the city into the Po River through the Fodesta. The water exited at the northeast end of the city, through the gate near Porta Fodesta, east of the road that led north across the Po River. Since the water arrived from the south and west, the western edge of the city became the site of most of the mills although there were mills throughout the city due to the historical development of the system.

4.3.2 Structure and Materials of the Canal Infrastructure

One of the most perplexing issues of the Piacenza canals was their spatial impact on the city in terms of width and depth. How much of an impediment to movement were they? Did people fall into them where they were left open and if so did they risk drowning? Most of the maps of the canals were done in plan view and show their route through the city. The widths in the maps vary and it is not clear how accurate they are. The authorities who had responsibility for water were concerned about depth as it was an overriding issue when they called for the canals to be cleaned and the build-up of silt and earth to be removed. In gravity-fed canals, even a slight deviation in depth or silt build-up could mean a miller downstream was unable to use his mill wheel.

As mapping progressed the profiles of the canals were added to provide the information so necessary to the system. The earliest profile found in this research, of an urban canal, is that of a proposed vault over a canal from 1727. In this case the author, Deputy Tinetti, gave a scale for the drawing, that of *oncie quattro piacentini*. An *oncie* was 3.9 cm but *quattro* means 4 and most likely simply describes that fact that the scale is drawn and designated as only 4 *oncie* in length on the diagram. The numbers themselves are difficult to read, the bottom of the canal is either 13 and 1/12 *oncie* (51cm) in length or 93 and 1/12 *oncie* (3.5m) in length. If the bottom dimension is 13 and 1/12 *oncie* then this would be a reasonable width for a smaller canal. If the number is really 93 rather than 13 the total dimension is much larger but also not an unreasonable width for a larger canal. A notation at the top of the diagram by Deputy Tinetti from 23 August 1727 indicates that this is to be a small inlet into the garden of the Capuchin Fathers from Rivo San Savino, in which case, the smaller dimension of 51 cm makes the most sense.

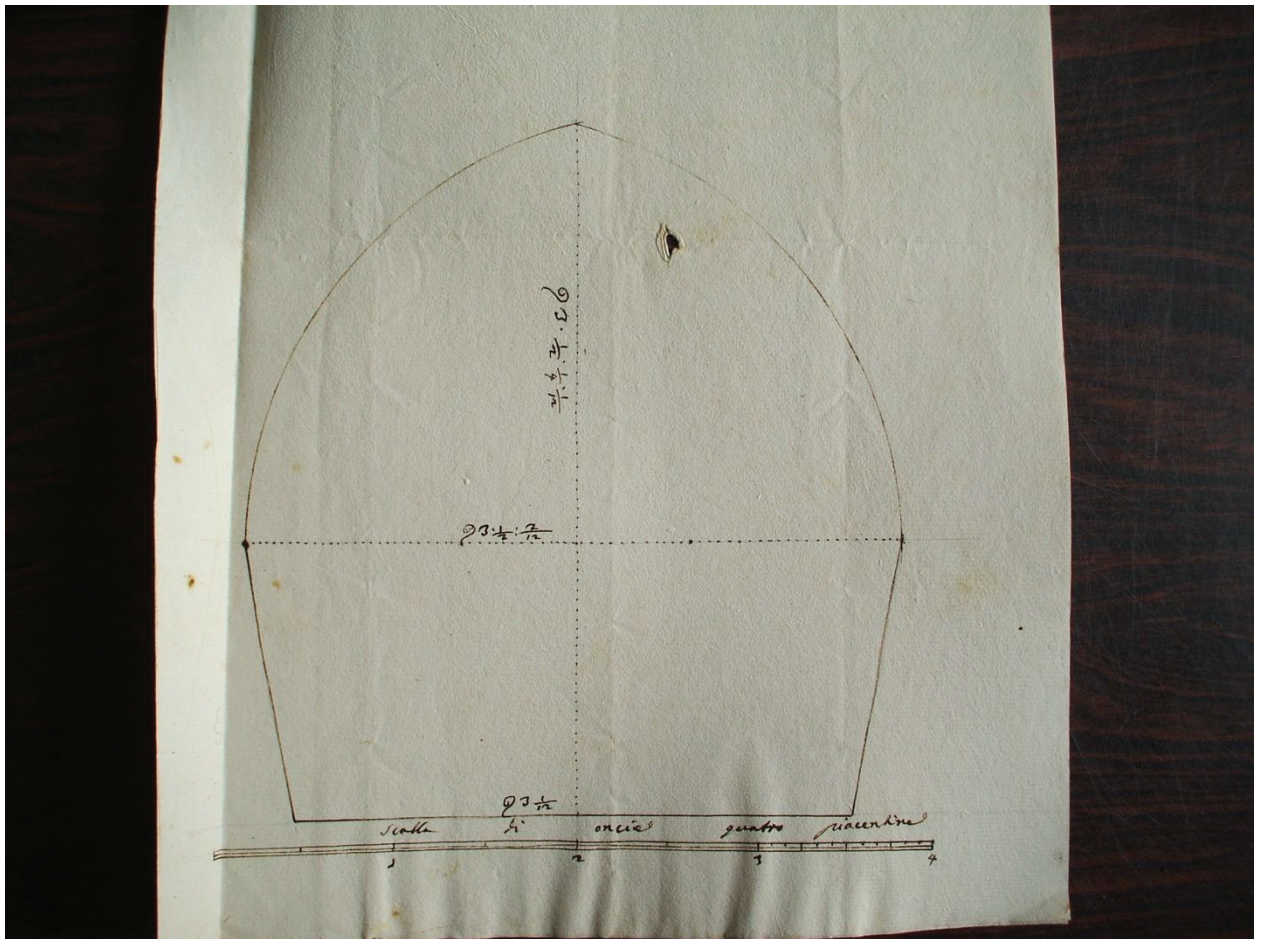


Figure 4-54: Diagram of a proposed vault from 1727. CSO busta 19.

The height of the covered conduit is also 13 *oncie* plus some fractions or about half a meter. But this does not indicate how deep this was dug into the ground. Did the vault stick up above the ground level or was the pipe completely buried? While this diagram shows the overall dimensions of a small pipe into a specific facility it does not show how the canals interacted with the space of the city.

The next profile for a canal is from 1741, by city engineer Giannanti Tocchi, and represents a large undertaking. It is a full profile of Rivo Comune from its starting point at the Trebbia, through Colonna to the city. The diagram begins at the *berline*, a lock, at the starting point of Rivo Comune and explains that it is made of stacked pieces of wood, two of which, on the bottom are fixed into place. Further along the map is a scale. The

map is in *braccia* for the dimensions in elevation. While the numbers are not clear it would appear that the berline from its foundation in the bed of the canal to its top was about 15 *braccia* in height or about 720cm, over 7 meters. This does seem reasonable as the lock was meant to manage water from a river that could run full and fast after the winter snowmelt. But this still does not answer the question of how the depth and width of the water channels affected the urban space.

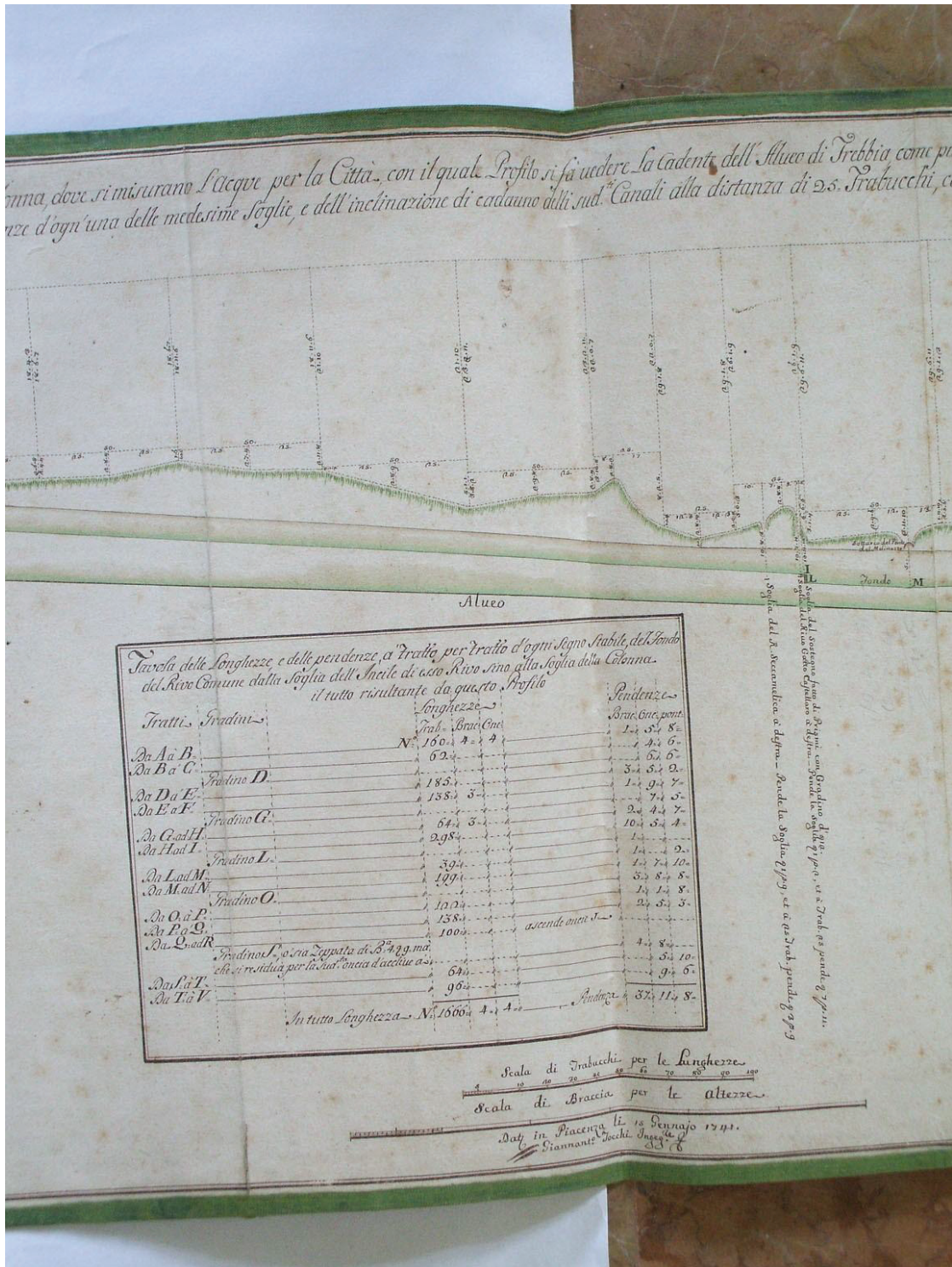


Figure 4-55: Scale used for profile of Rivo Comune, ASPc, mappe e disegni 6337_cg5, 1741.

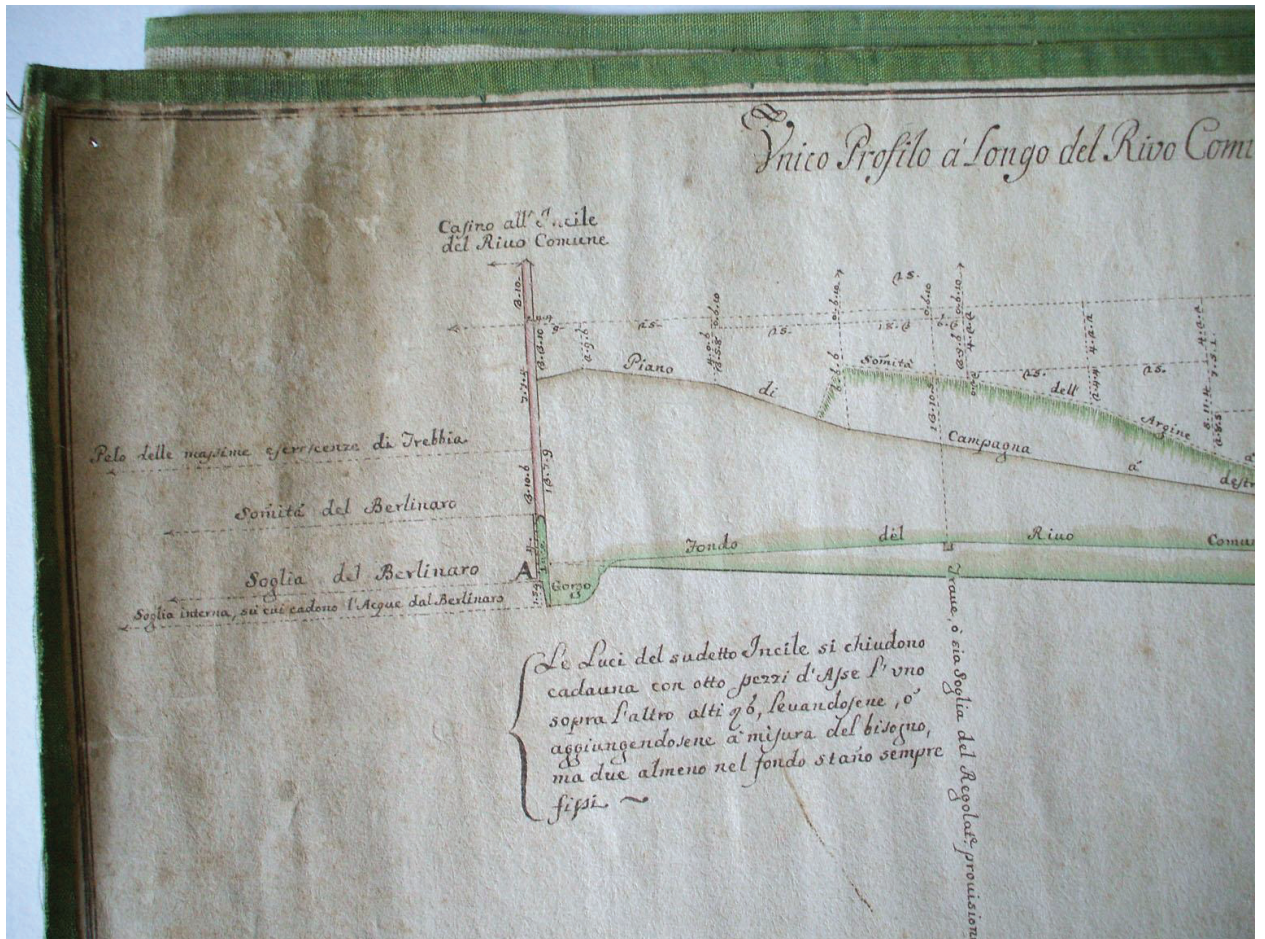


Figure 4-56: Profile of Rivo comune at the beginning of the water channel, height of berline is given in braccia. ASPc mappe e disegni 6337_cg5, 1741.

Better information on urban canal depths can be found in later maps especially from the 1830's. There was obviously an effort to clearly record the city water system and the results are maps for several canals that include profiles with depths as the canal ran through the city. The struggle with these maps is their unit of measure.



Figure 4-57: Map of Rivo della Zecca with profile and scale. ASPc Mappe e disgne 1384_5_32, 1829.

This map of Rivo della Zecca from 1829 includes a profile of its run through the city with depths at varied locations.

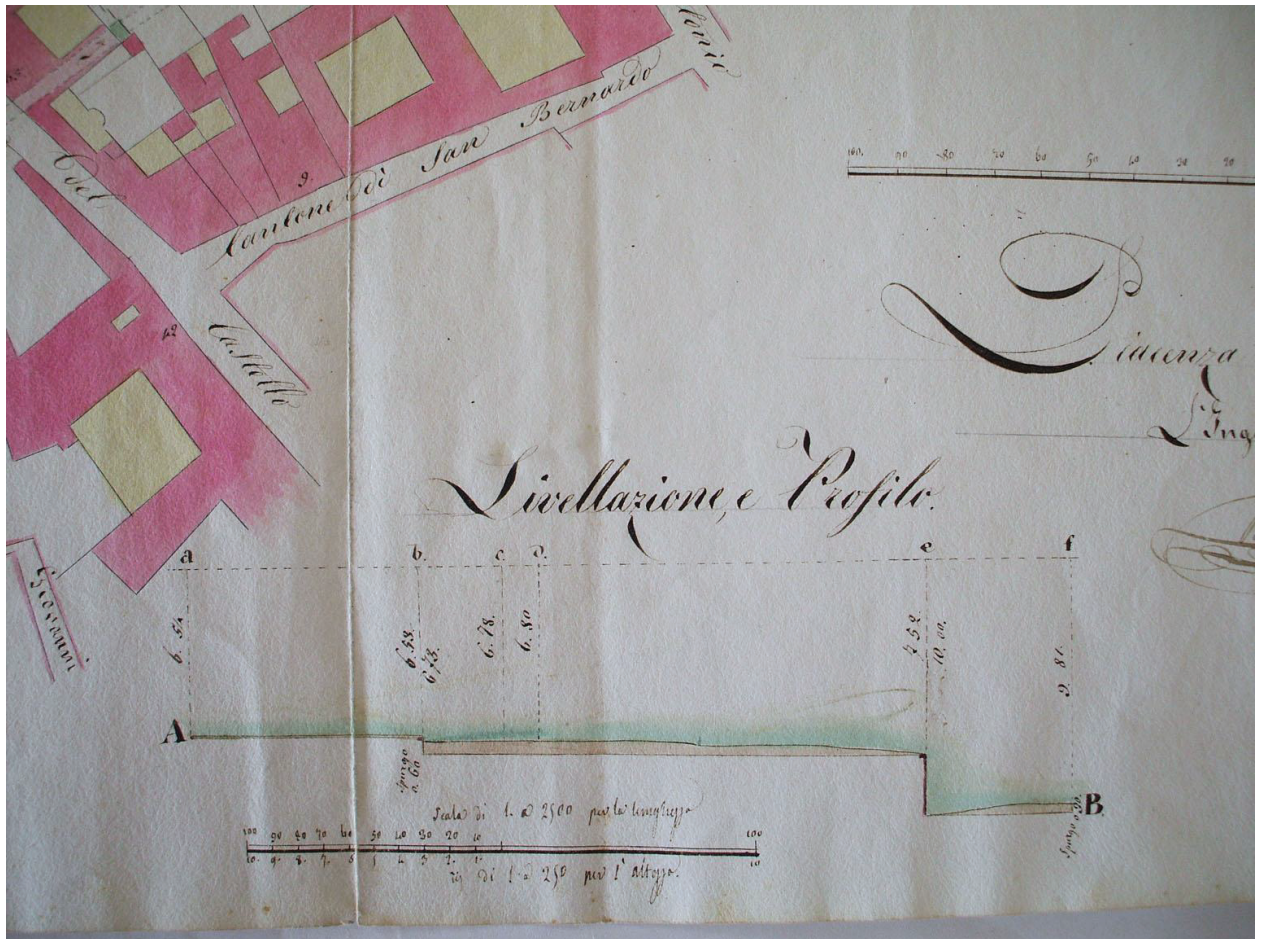


Figure 4-58: Detail of map of Rivo della Zecca that shows profile and scale. ASPc, Mappe e disgn 1384_5_32, 1829

The scale is 1:250 for depth of the water channel but no system of measure is indicated. This raises the question of whether this is in *piacentini braccia* or in meters. The meter was first defined in France in 1791 but the system was not universal for quite some time frequently due to political disruptions⁴⁹. If the unit of measure is meters then the dimensions range from 6 to 8 meters for the depth of Rivo della Zecca. 6 meters is a significant depth, similar to a modern two storey residence. That would make the canal a deep gash in the urban landscape. It is more likely at this date that the measure is in

⁴⁹ Information on history of the metric system found at http://www.sciencemadesimple.com/metric_system.html#History

braccia in which case the total depth is reduced by little more than half for a depth between 2.5 and 3.5 meters.

An 1830 map of Rivo Trebbiola also fails to name a unit of measure though the scale is 1:250 for depth. However, the depths range from around 2.5 units to 7 units and show a clear decline along the length of the canal. Converted from *braccia* the depths would range from 1.2 meters to 3.3 meters. If the units used were metric then the depths range from 2.5 meters to 7 meters, a significant feature in the landscape of the city.

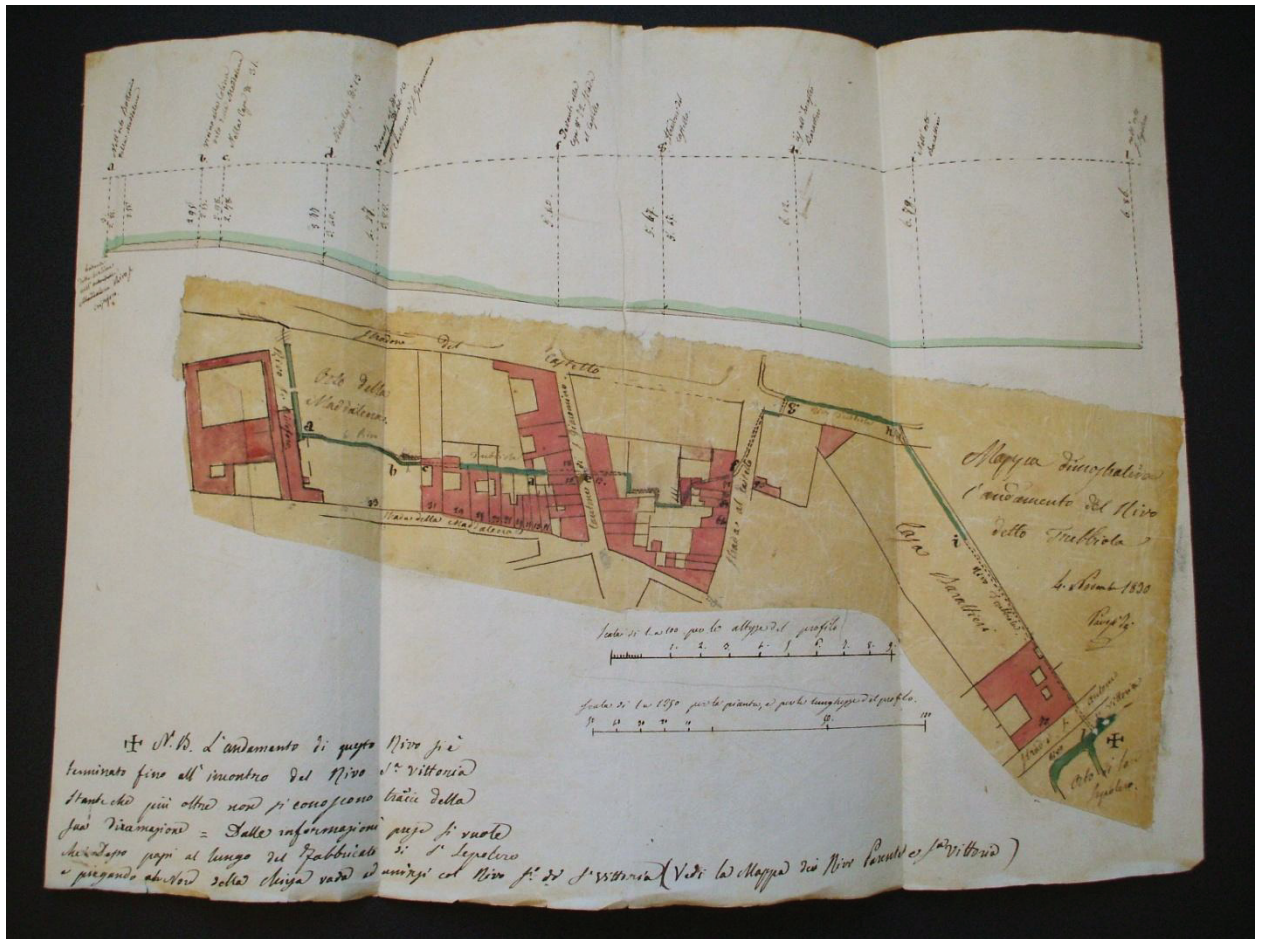


Figure 4-59: Rivo Trebbiola with profile and scale, ASPc, AT_2_3d, 1830.



Fig4-60: Detail of elevation from Rivo Trebbiola. ASPc, AT_2_3d, 1830.

Another diagram from that time is a profile of Rivo della Gosa from 1854 and it too lacks any designation for the units of measure. In *braccia*, the depths given are similar to the slightly earlier maps with an average depth of 2.8 *braccia* (1.2 meters).

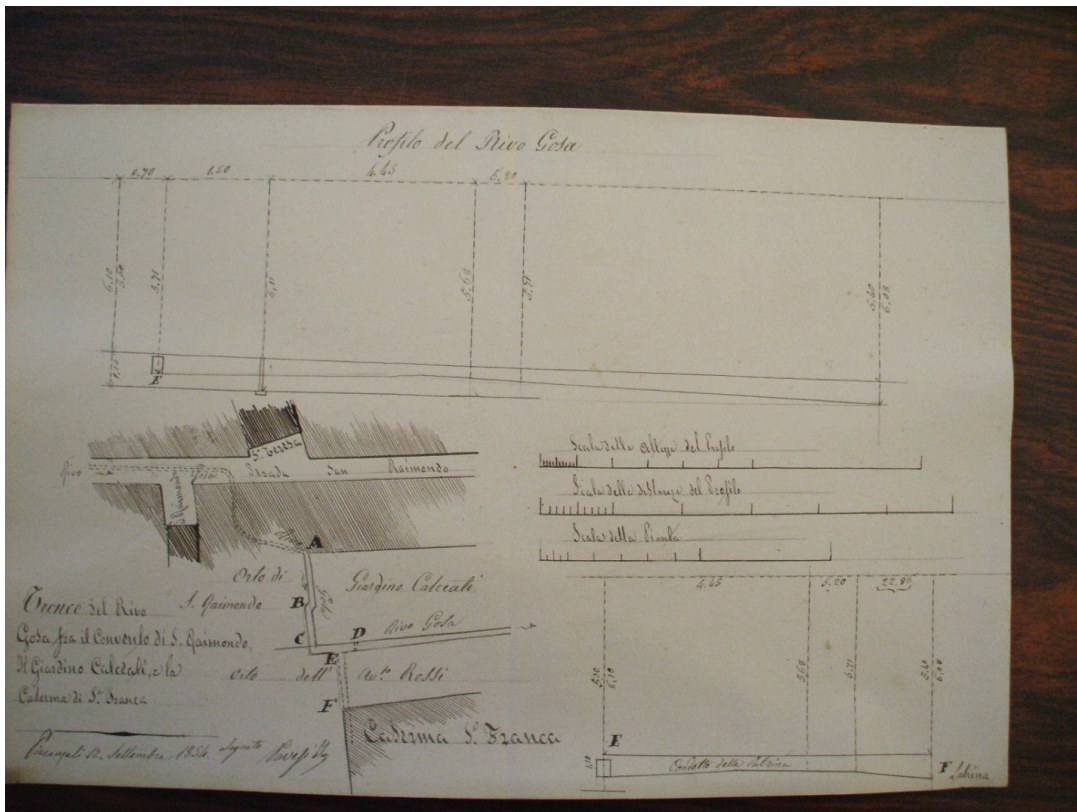


Figure 4-61: Diagram of Rivo della Gosa, ASPc AT-7-44, 1832.



Figure 4-62: Rivo Meridiano with profile and scale, ASPc mappe e disegne 4873_5_6, 1881.

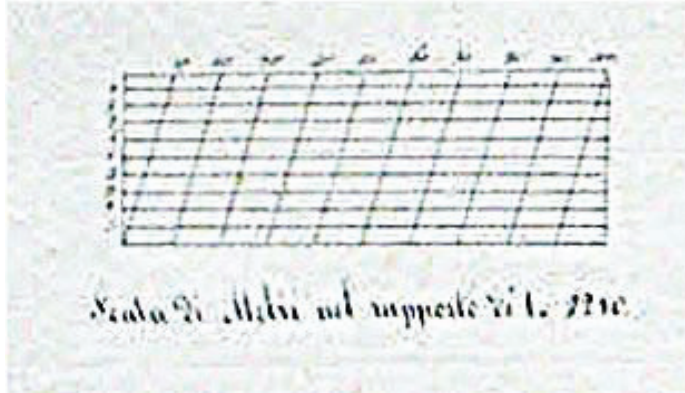


Figure 4-63: Detail of Scale from map of Rivo Meridiano. Note it is a 'scala di metri'. ASPc mappe e disegne 4873_5_6, 1881.

Finally, a map from 1881 of Rivo Meridiano makes clear the system of measure that is used and that is metric. Yet questions remain, the depths on this map appear to average 3 meters below ground level but went deeper in areas. What does this mean for the information on previous maps? Was Rivo Meridiano deeper than the rest due to its later construction date? Rivo Meridiano may have been unique also due to the fact that it flows through the topographical highpoint of the city, the Gotico and Piazza Grande though from there it also flows down one of the steeper slopes in the city to Piazza Duomo.

The depth of the canals raises a question about the banks or sides of the water channels. Normally, an unreinforced bank should not have a decline of more than 33%. An unreinforced channel that was three meters deep and open would have to have a significant width to support the depth of the canal. That seems unlikely in how the canals meandered their way through the city. The canal banks then would be reinforced by brick retaining walls which would give the canal the potential to be fairly narrow as it ran alongside the city streets. But where these canals were open, especially within gardens, a safety issue would have been present for humans and animals. Three meters is generally the equivalent to one storey in a building today, falling into one of the canals could have been a life-threatening event.

The depths, if they range up to three meters or more also raise questions about usage. It is clear from the elevations that the water was not that deep in the channel. It appears to run at the bottom of the canal though in flood times would have been deeper. More critical would be how homes and businesses would have connected to the canals. Water runs downhill. If the water in the canals is over three meters down in the ground then it would be difficult to get it into a courtyard without a pump or drawn up through a well. Most of the basements would only have been three meters deep, so deeper water in the canals would have made access difficult. At these depths it is easy to envision connections from homes that sent sewage away from basement cisterns, downhill into a canal. It is more difficult to understand how people could have brought the water up into a courtyard for laundry or other domestic uses except by hauling it up in buckets through a vertical channel. However, the topography of Piacenza and its surrounding area may have left the city without many choices. The waterways entered the city in tunnels that crossed the city moat or ditch, at least sometimes under the roads at the gates. But then it had to flow downhill to the exit at Porta Fodesta and the only way to do that would have been through progressively deeper water channels. However, if the majority of the maps examined are in *braccia* then the average depth of the canals ranged from 2.5 to 3.5 meters (6 to 7 *braccia*).

Maps do not give any specific widths for the canals though at times, the open sections, appear quite wide. A diagram of a house submitted to the CSO in busta 19 shows the Beverora canal as it ran along the street in front of the building.

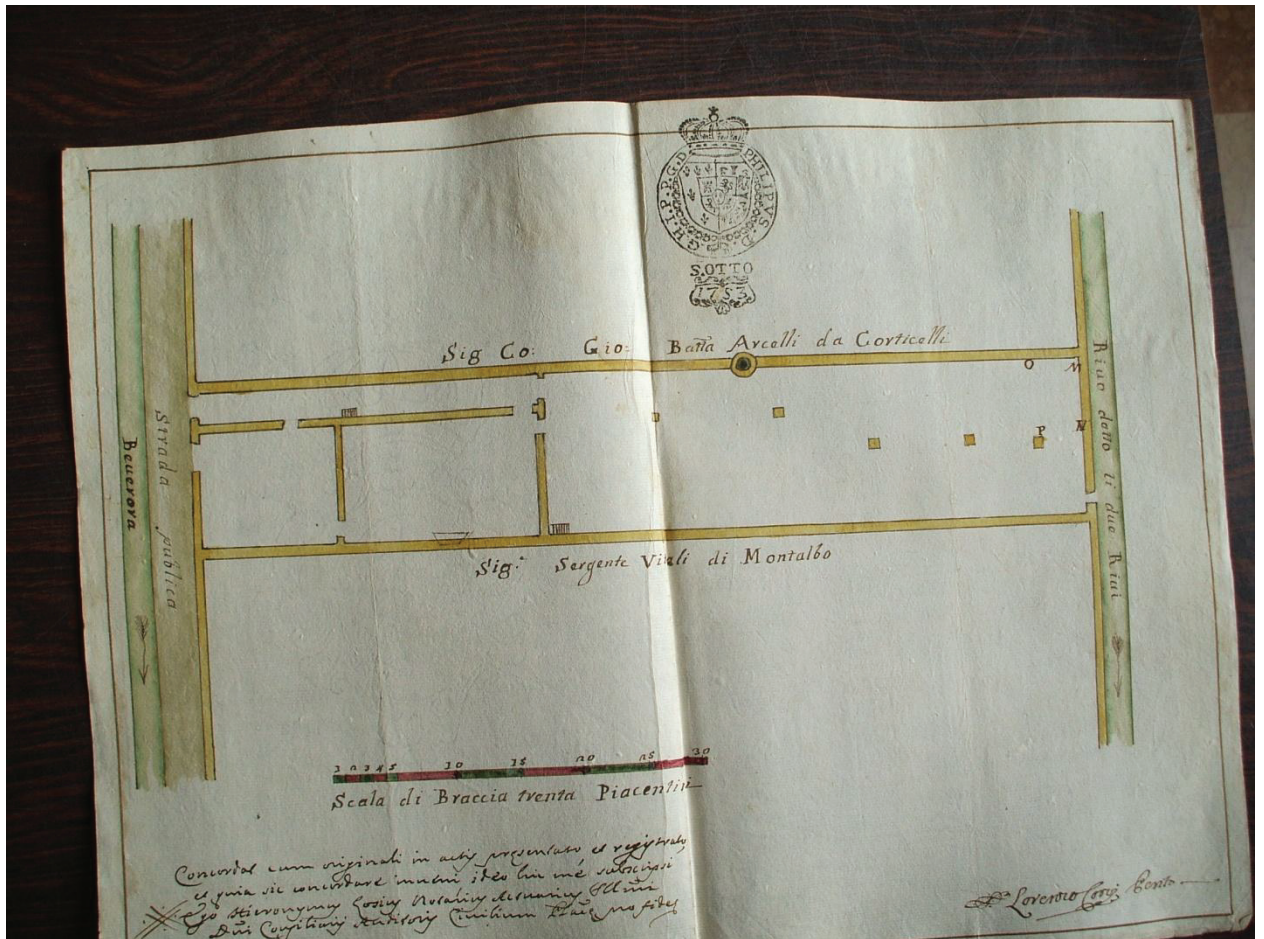


Figure 4-64: Diagram of house between the Beverora and Due Rivi canals, scale in braccia, CSO busta 19.

The scale is given in *braccia piacentini* and the Beverora looks about 3 *braccia* wide, around 1.5 meters. But since the house is the subject of this diagram it is quite possible that neither the Beverora nor the Due Rivi at the back of the building is actually drawn to scale.

Another diagram from the second half of the 18th century shows a building that housed mill wheels located near San Sepolcro. The diagram shows the scale of the water course in relation to the building. But no dimensions are given so it is unclear how wide the channel really was.

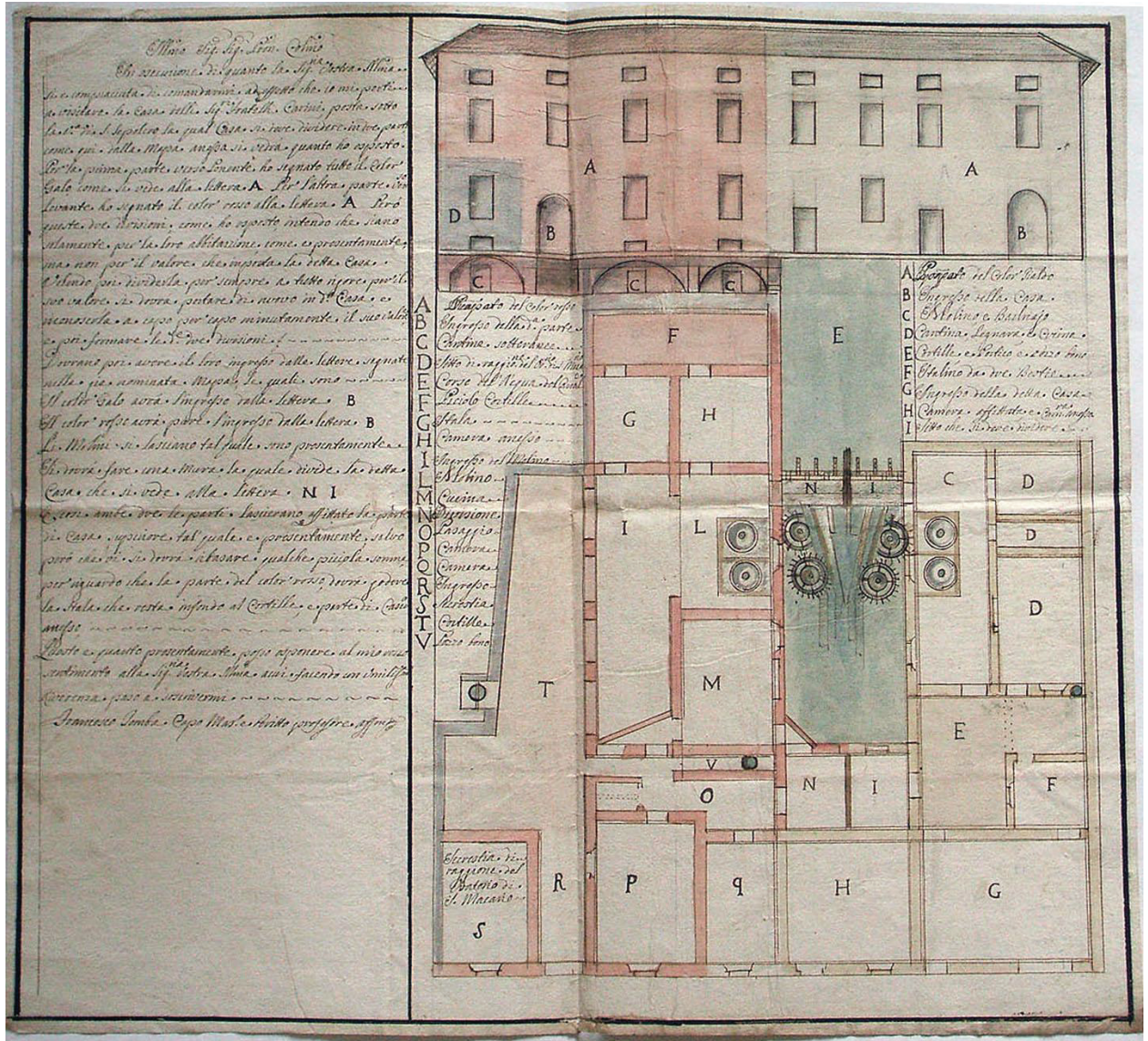


Figure 4-65: Plan and elevation of mill facility near San Sepolcro, ASPc mappe e disegno 1086_16_48.

Another small diagram shows the relationship between an urban water channel and the surrounding streets. The unit of measure is the *braccia* and Strada di Cantarana is given as 8 *braccia* wide. The water channel looks similar in width though the bridge is given a dimension of 7 *braccia*. That would make the water channel in this case around 3.5 meters in width. The water flows under the larger road that goes to the city gate and this road is 34 *braccia* or more than 16 meters wide. However, while the vault that flows

under the road is designated at 34 *braccia* in length, the scale shows it to be no more than 20 *braccia* or 9.6 meters, a more likely road width. The location of Strada di Cantarana means that this water channel could be the Fodesta or the Rivo della Zecca near where it flowed into the Fodesta.

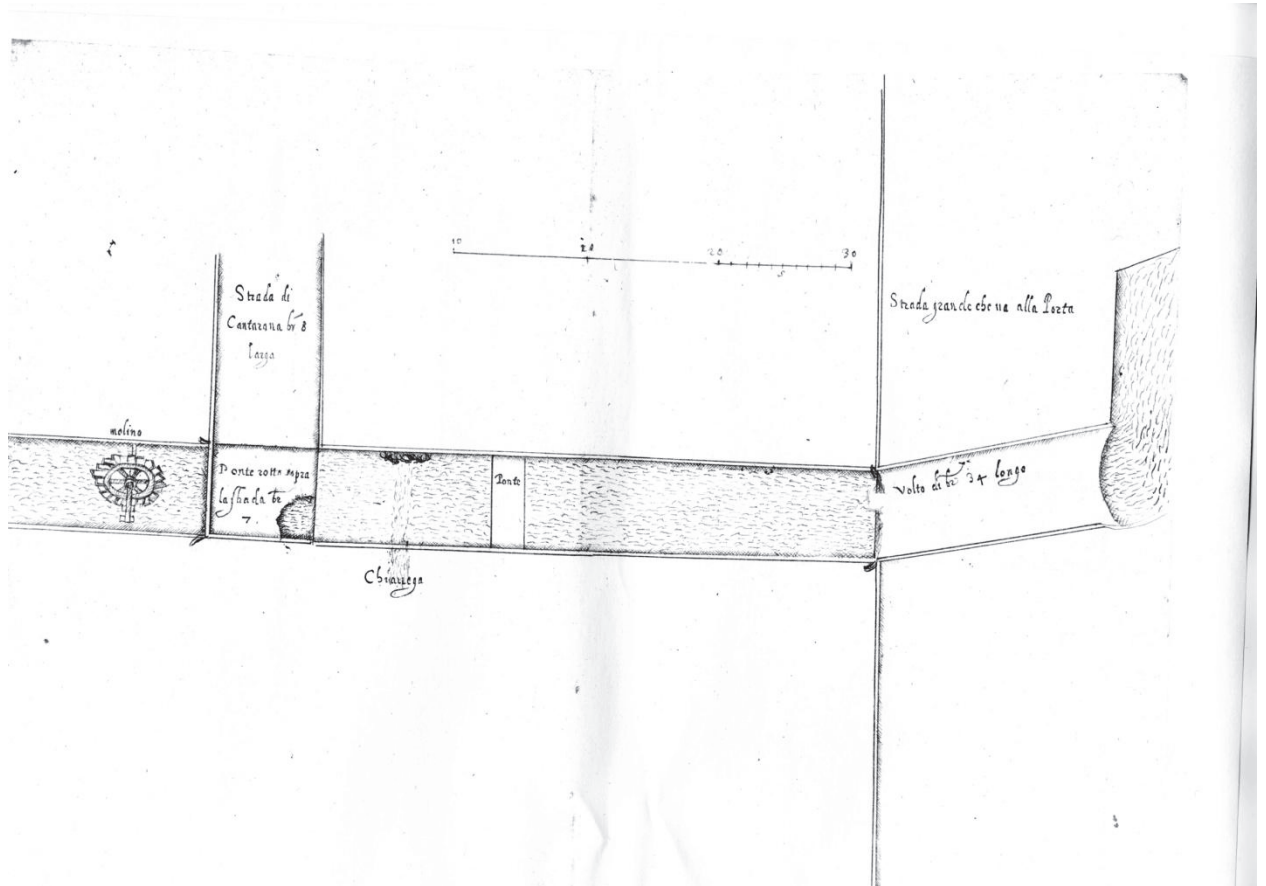


Figure 4-66: Diagram that shows Strada di Cantarana, a water channel, bridges, drains, inlets and a mill wheel with scale. CSO busta 7, 1619, varie 2.

A final undated diagram from the countryside shows a buried water channel, gives its height, and demonstrates its relationship to the surrounding structures.

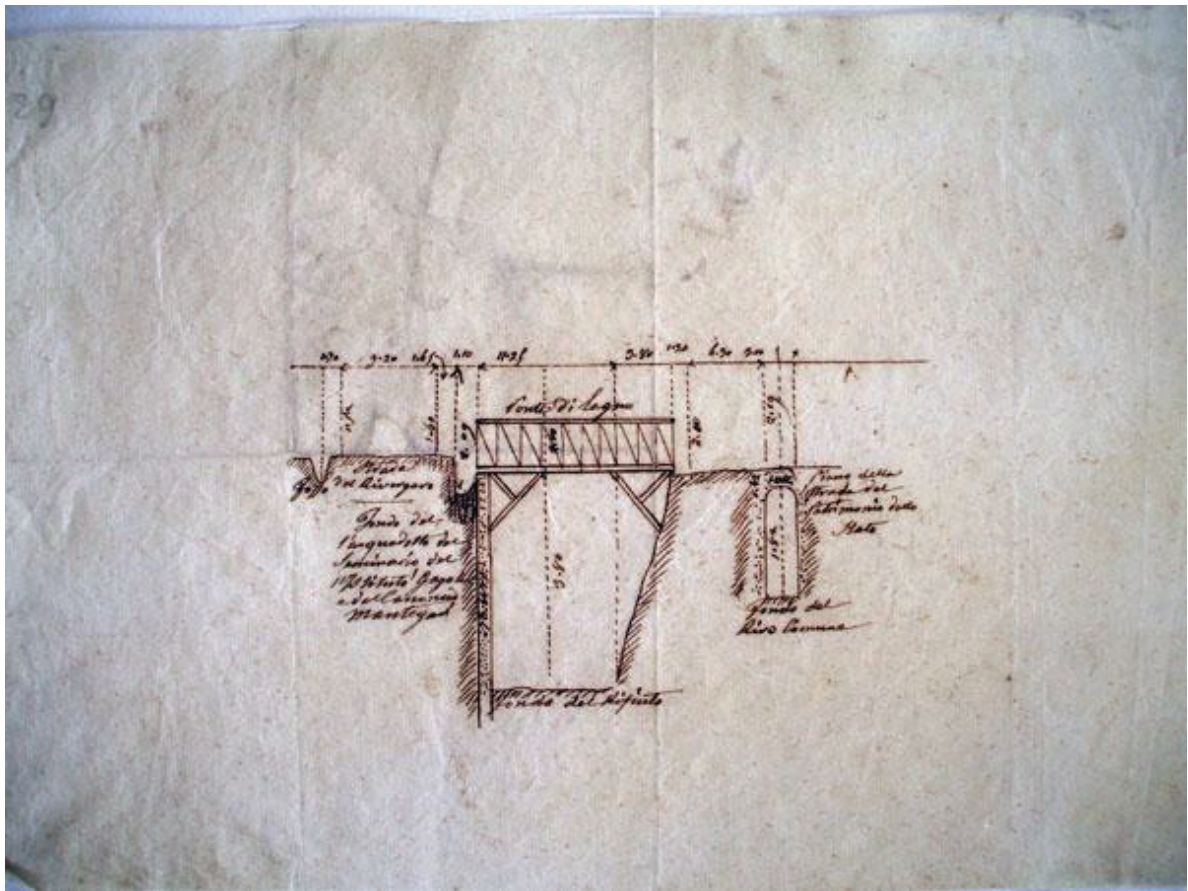


Figure 4-67: Profile of bridge and Rivo Comune, ASPc, mappe e disegni 6443_5_29A, undated.

The diagram shows a bridge of wood over a 3.8 meter drop that ends in the bed of Rifiuto, a channel to carry waste. Alongside is a smaller, buried channel designated as Rivo Comune with a total height of 1.8 meters. Rivo Comune appears quite small in this diagram considering it carried most of the water for the city.

The maps show canals that averaged 2.5 to 3.5 meters in depth as they flowed through the city. The single designated width of a canal is also around 3.5 meters. This kind of width would have demanded bridges for traffic to move around the city. However, that particular width may have applied only to the wider Fodesta canal. The other canals may have been narrower. Even so, the canals at one point were a significant feature in the landscape of Piacenza.

How were the canals constructed? In essence a canal had to have a bed in which to direct the flow of water, which if possible was waterproof or nearly so when the water had to cover any distance. There were openings from canals to smaller water channels and locks that could be used to close off or restore an opening to manage the water flow. From the household or street there were drains that allowed sewage, polluted water, and rain water to flow back into the canals. The key to how the system operated was the ability to shut off or open water flows to different areas and customers.

Over the course of the two centuries a variety of terms were employed by residents, committee and engineers to describe the system. *Gatto* is a very consistent term, a local *piacentino* word that described a water pipe. *Bocca* is also used for the entire period although it underwent a variety of spellings. It most frequently described the opening of a canal, often between the major water channel and smaller conduits that led to homes or mills. People were given control of these openings and could close them off as needed, and they were billed for the privilege of that control. A *chiavica/chiaviche* was a covered canal or a drain that could be opened or closed to regulate flow in either direction. Other terms occur less frequently in the records but an important shift in canal management is indicated by the term *volto* (vault). The first reference to a vault in the archives is on 7 October 1629 in a *capitolo*, an infrastructure construction agreement. The document cites an agreement between Count Cristoforo Landi, a city official with membership on the CSO and Master Pietro Drago, a wall builder to construct a *volta* over the Rivo San Savino. This involved construction on a road and affected a miller. The work order included the materials to be used and the expected costs and payment for the work. The importance of this document is that it shows a request to bury the canal as it flowed through the city⁵⁰.

The next reference to a vault in the records is in a report on 18 January 1693. In this engineer's report by Cremonese the vault was requested by Master Matteo Monti. He wanted to build a vault and a wall and to cover part of the Fodesta a short distance from the Porta di Borghetto where his house was located. Master Monti had a new furnace/kiln or oven sited in the courtyard of his house and wanted to use the power of

⁵⁰ A2-F1-12.

the Fodesta canal water in a controlled manner. The solution was to build a brick wall along the banks of the Fodesta with three new openings (*bucche*) created with slots of stone to control the water so that the furnace would receive the benefit of the power of the Fodesta and clean water could flow back into it. The engineer saw this construction design as the chief advantage of the proposal and recommended it to the committee⁵¹.

The next mention of vaults occurs in a bill located in the folder for 1694 although the document date may actually be later than that. It is a notice of expenses for work done to fix a piece of vault and a *chiavica* for Santa Maria Ceriola. The bill involved other kinds of work at other locations but did not specify the amount for the work at Santa Maria Ceriola⁵².

A tax document, which references the year 1713 described the work that had been done and required funding to include . . . *un pezzo di volto*. . . a piece of vault. Several locations are named further in the document so it is not possible to pinpoint the canal that contained this vault⁵³. Around that same date, in August 1713, a license was issued to construct a vault in good mortar and brick above the Fodesta near San Bartolomeo. The person who received the permit was then obligated to clean that portion of the canal and pay the expenses⁵⁴.

On 30 June 1719 a license was granted to Antonio Guglieri to build a covering over the canal known as Rivo San Nicolo, which passed near his house in the parish of San Nicolo. The location was described and included neighbouring properties. The concern of the committee was that Guglieri build the new vault or cover for the canal in such a way that it left enough space to clean that part of the canal. He and his heirs would cover the total cost of the vault over the canal⁵⁵. In this case it appears that Guglieri wanted to

⁵¹ CSO 17-F1693-1.

⁵² CSO 17-F1694-37.

⁵³ CSO 18-F1714-37.

⁵⁴ CSO 18-F1709-50.

⁵⁵ CSO 18-F1718-4.

‘Si concede licenza al Sig Anto Guglieri di poter far un volto di cotti sopra il Canale detto di S Nicolo, che passa tra le di lui case poste in questa Citta nella vicinanza di S Nicolo, e l’orto del Sig ? Mocellani per la lunghezza di tutto il fronte delle da due Case, purché faccia con volto assai piu alto di quello vi e presentemte dalla parte cesso sera sopra il

cover or bury the canal near his home, and the committee was willing to allow that kind of work as long as it conformed in terms of materials and allowances for future maintenance. The final reference in this time period to a vault is in an order issued by the committee on 14 December 1724. The order dealt with Rivo della Gosa and a vault and wall⁵⁶.

The term for a vault generally occurs late in these records. Along with it is the word *coprire*, to cover. It occurs two times, the first in the document already cited about the Fodesta and Porta Borghetto, and the other occurrence in a letter from around 1720, in which the writer expressed the desire to cover over part of Rivo della Zecca⁵⁷. A final term from a report by the engineer Baratieri in 1671, occurred once in the archive and indicates a buried canal. In the report he referred to Rivo San Siro just outside the city walls and explained that the *tomba* was broken where it took the water beneath the city ditch near San Agostino⁵⁸. He went on to explain the length of buried canal involved, the materials to be used in its repair, brick and mortar, and gave a total cost of 2,600 lire for the repair efforts⁵⁹.

These examples from the late 17th century show that there was an increased effort to bury the canals both on their approach to the city and inside the city walls. The effort to cover over the canals appears to have been progressive and piecemeal as residents applied

medmo Canale, all circolto della casa del vicini, contigua a do Sig Guglieri con che lascia una sufficiente commodita per espurgare quella parte di Canale, che divando coprire con volto qual espurgo sempre dovra fare il medo Sig Anto Guglieri, e suoi eredi a tutte sue spese, per tutto il tratto di Canale, e che esso fara coprire con il volto.. .’

⁵⁶ CSO 19-F1724-6.

⁵⁷ CSO 18-F1718-17.

⁵⁸ The word *tomba* generally refers to a tomb or grave. In this case it most likely refers to a buried canal, something that would have been essential to get the canals into the city across the moat. The canal may well have run under the road that entered into the gateway.

⁵⁹ CSO A3-F1-9 ‘. . . con andato vedere la tomba rotta con la quale possono l’acque del medesimo rivo sotto il fosso della Citta, di dietro del Monastero di Sto Agostino , et ho trovato che bisogna fare tutto il volto e sponde del medesimo gatto, o tomba in longhezza di bracia otantacinque in cerca, et questo di quadrelli con bona calcina, et assoni, x le sponde. . . ‘

to do the work that would cover the channel that ran through or near their properties. Later detailed canal maps show water that not only looped and twisted throughout the city, but also was buried in some spots and open and accessible in others. To cover the canals raised the immediate issue of how to access and clean them. It also would have increased the difficulties to maintain the gravity flow, as the canals were sometimes hidden underground and then exposed and available. No matter whether an individual canal was above or below ground, it had to keep flowing downhill all the way to the exit to the Po River and therefore required periodic cleaning. The depth of the canals, especially in their open sections, would have had a significant impact on the urban landscape, while increased use of covers and vaults underground reduced their visibility, the possibility of things falling into them, and the smell and impact on urban life.

It is possible that vault was also used to designate the curved and corner portions of the canals. In their journey through the urban space, some canals took right angle turns. If water was flowing fast and hard as occurred in the late winter, this would have created a lot of stress on the infrastructure at the corners. It is difficult from plan views to visualize what the canals actually looked like, as they flowed through the city. Figure 4-44 of a proposed vault is one of the few that shows an elevation of the canal infrastructure and the shape of a vault to cover the channel. In modern measurements that vault was around 185 sq cm; because the vault slopes, the volume is actually less than the squared dimensions. If this kind of channel took a turn it would have required a specific type of construction.

The materials used for canal and infrastructure construction appear to have remained fairly constant throughout the 200-year period. The materials that the Farnese inherited were those that continued to be used although there is evidence of attempts to upgrade the infrastructure as shown in the orders that concern the use of pavement on city roads. The primary materials in use were brick and stone with a lime and sand-based mortar and clay-based terracotta. Both iron and wood were used for the locks in the canals to regulate water flow.

In 1599 Camillo Morando wrote to the committee to request an upgrade along the public road that ran from the Porta Borghetto to the Porta Fodesta to facilitate carriage

use. He wanted a conduit and drains of brick to ameliorate the rainwater runoff along the roadway. The license was granted for the work, with a stipulation that it must meet the requirements and measurements provided by the city engineer Bolzone⁶⁰. In another document on 20 September 1601 an expense list was submitted to the committee that itemized the maintenance work done, which included paving a piazza and repairs to canal openings, the materials named include brick and sand⁶¹. A decree from 28 June 1603 detailed repairs to Rivo Beverora and the openings and banks of the channel. It was stipulated that brick and mortar would be used along with stone where needed⁶². On 11 August 1610, another order issued from the committee dealt with Rivo della Gosa and the mill for San Siro. The work had to be done with mortar and good brick in accordance with the detailed description of the construction given by the engineer Giovanni del Bruno⁶³.

The same materials were used for upkeep of the city cisterns. In 1640 the committee received a letter from the association for the *pozzo comune* in Strada del Guasto. This letter was signed by the engineer, Bartolomeo Cremonese. He explained that the drainage designed to remove rainwater from a courtyard was damaging the *pozzo comune* which had an inlet made of stone. There was a request, which incorporated a quotation from a city statute about road maintenance, to repair the situation. Another document that appears to depict the same problem described the involvement of several other persons and included a miller and tenant millers. It is clear that the cistern or *pozzo comune* had a stone covering which may have caused some of the problems⁶⁴.

A tax document from 2 March 1648 described repairs needed for the drain at SS Jacopo and Filippo and the material named is *pietra di marmo*, or marble stone⁶⁵. A bill

⁶⁰ CSO 4-F1-12.

⁶¹ CSO 4-F3-7.

⁶² CSO 4-F5-8.

⁶³ CSO 6-P1609-12 and AT6-LP-1.

⁶⁴ CSO 14-F1-60, . . . ‘perche quell acque del detto molina nel discendere poi verso la Strada del Guasto, passano sopra la bocca del detto pozzo, benche chiusa con pietre, e come che ui li fermano e sono continue, penetrano in quello a poco a poco. . . ‘ and 14-F1-37B, . . . ‘o sia Pozzone, quale e solito tenersi coperto di pietre, e nel quale per mezzo di certi condotti sottessamei si scollano con l’acque piovane, . . . ‘

⁶⁵ CSO 6-P1660-4.

to the committee dated 16 April 1657 describes the purchase of mortar, sand and bricks to do infrastructure repairs⁶⁶. A payment made by the committee for repairs to Rivo San Siro on 13 March 1683 contains the comment that the repairs included *mazzi di ferra*, bars made of iron that had to be removed and repaired⁶⁷. In 1704 Filippo Paterini wrote a letter to the committee about a vault of brick that rested beneath his room from the Rivo Meridiano. He gave its dimensions and noted that it had a cover made of wood planking⁶⁸. In a letter dated 20 September 1709 Felice Genesti, Antonio Banelli and Pellegrino Cella wanted to create a rainwater channel in the road that would have a cover of brick and stone⁶⁹. A bill from 10 January 1710 also describes several types of infrastructure made from bricks and mortar, and stone⁷⁰. An order signed by the chancellor on 29 October 1716 dealt with an open drain that had caused private and public damage. The drain was in a public road near the church San Savino and was part of a *pozzo di legno*, a cistern made of wood⁷¹. On the 18 October 1717 a tax document was issued to cover the cost for a *gatto di cotto*, a conduit made of terracotta that ran under the road near the convent of San Siro and had broken⁷². An engineer's report by Bartolomeo Cremonese on 10 May 1718 mentions wood, stone, and pebbles (*sassi*) for various parts of the infrastructure⁷³.

The people of Piacenza had a limited number of materials available that could conduct water and do it both above and below ground. Bricks with mortar do not create a waterproof wall. Today we could cover a structure with a coating of bitumen or with a

⁶⁶ CSO 12-F2-60.

⁶⁷ CSO 16-P1683-7.

⁶⁸ CSO 18-F1702-25, ‘. . .una volta con quadrelli sopra il Rivo Meridiano di longhezza brazza dodeci, e larghezza brazza tre in circa che resta di sotto ad una camera inferiore della propria abitazione che di presente era coperto d’asse nuovibili, come pure continguo a detta camera vi e un sito aperto. . .’

⁶⁹ CSO 18-F1709-19, ‘. . . a farlo coprire di quadrelli, e pietre. . .’

⁷⁰ CSO 18-F1709-46.

⁷¹ CSO 18-F1714-13, ‘. . . che visto il presente dobiate far metere una saranna al pozzo di legno con sua chiave e cantana acciaio non resti aperto in danno e pericolo del publico e privato, e questo perche voi vi servite del detto pozzo qual resta in strada publica nella detta X S Savino e questo sotto pena di scuti dieci d’oro da xxx tolti et applicati all Ufficio della xfata Ill,ma Congregazione in caso x et ex Offico.’

⁷² CSO 6-P1701-3.

⁷³ CSO 18-F1714-61.

plastic exterior membrane. We cast sewer pipes in solid concrete and minimize joints, although seepage still occurs. We also use plastic and copper for water conduits. In the sixteenth century, there would have been seepage at the many joints between bricks and stones, through the mortar if it lacked a seal. The records show frequent breaks in the infrastructure for canals, street drainage, and sanitation and sewage structures. Such breaks and ordinary seepage could certainly have polluted water supplies from canals and sweet water wells, with sewage or other pollutants left in the cisterns. In some cases, the different infrastructures could have been quite close to one another which would have increased the risks of cross-over pollution. The documents show attempts to limit future repairs and their costs through use of materials such as stone for street locations that had carriage and cart traffic. The repeated call for good bricks and mortar was an obvious effort to avoid infrastructure failures due to substandard materials. This would be especially true in the case of mortar, since the proportions and quality of the ingredients can affect the longevity of the mortar and the bond between bricks and stones.

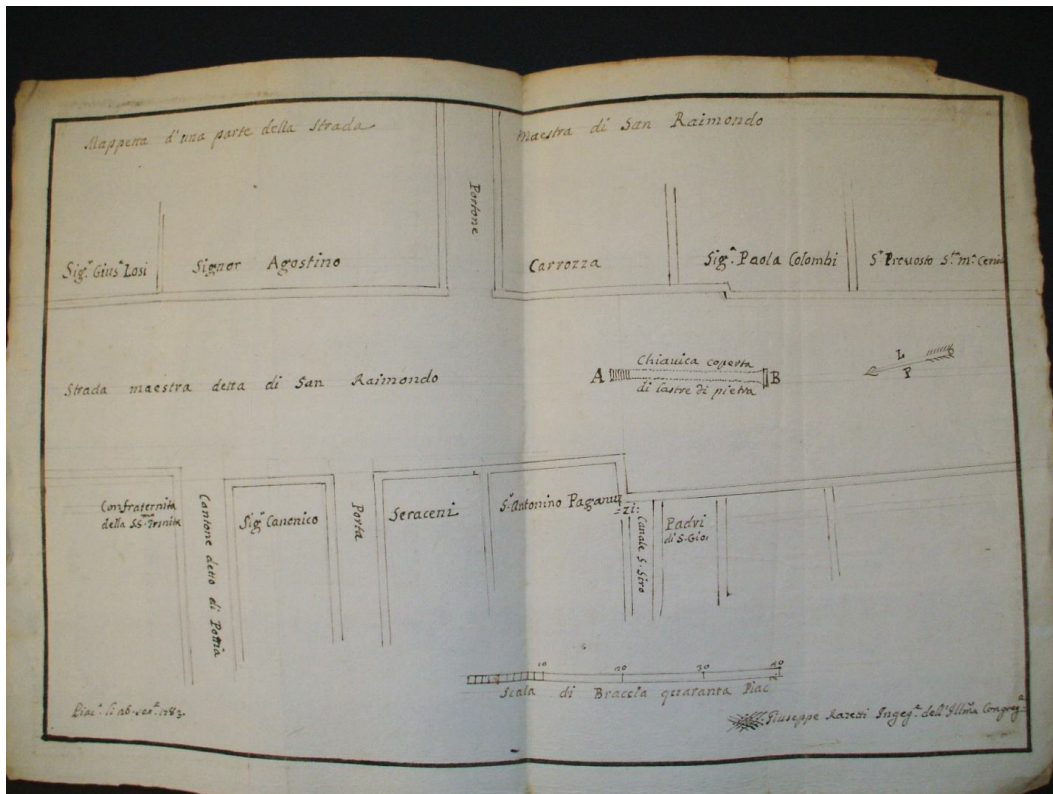


Figure 4-68: 1780's diagram of Strada di San Raimondo and a street drain made of stone. ASPc, AT busta 6, fasc 4c.

4.3.3 How the Water was measured

The management of a resource involves the quantification of the supply so it can be efficiently apportioned out to individuals or institutions. Water is particularly difficult in this respect, as it requires a measurement of the rate of flow in order to truly quantify what is available. A canal provides a defined channel through which the water runs, and so there is, in terms of the channel, a measure of the area of the opening, the channel volume, and the length of the conduit. But this does not explain the flow or velocity of the water in the channel, the water might be high or low, it might move sluggishly or at a fast rate, or the canal may be newly cleaned or partially filled with debris; all of these conditions impact the water's flow and the user at the end of the pipe. Water that flows too fast can damage a landscape in a kitchen garden, too slow and mill wheels do not move and grain cannot be ground. For those who lived in the city, the first important measure of the water was taken at Colonna, the city waterworks. The measure of water that travelled from the Trebbia into the Rivo Comune and Rivo Piccinino at Colonna determined everything about water downstream in the city. Unfortunately, the managers of the water utility of the city of Piacenza had no precise means to measure water velocity or flow, and this created conflicts over water management.

Vaciago, in her thesis, defined the terms used to measure water. The first term is *oncie* or in early spelling, *onze*. An *oncie* equalled the 12th part of a piacentino measure of length, the *braccio*, which is approximately 48 cm. To get the size of a pipe the *oncie* was squared. So a single *oncie* squared was approximately 3.9 cm squared or 15.21 sq cm⁷⁴. While this may give the area of a pipe opening, it cannot show how much water is actually flowing, or at what speed through the pipe.

⁷⁴ Vaciago, Il regime giuridico delle acque di Trebbia nella storia, ' . . . L'oncie: cm. 3,9 e la dodicesima parte per braccio piacentino, antica misura di lunghezza; moltiplicando cm (3,9 x 3,9) abbiamo cm 15,21 ossia l'oncie quadrata che e appunto l'unita di misura stabilita. . . ' 10.

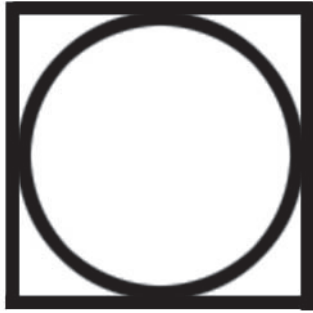


Figure 4-69: Approximate size of 15 sq cm pipe.

Vaciago quotes Baratieri to define *la canala*, the measure used for the main water channels at Colonna. The agreement was that Rivo Comune and Rivo Piccinino would each receive 108 *oncie quadrate* (squared)⁷⁵. This figure was arrived at, according to the quote from Baratieri, by multiplying 12 *oncie* (46.8 cm) of width by 9 *oncie* (35.1 cm) of height to get a squared figure for the size of a canal (1642.68 sq cm), that is, a *canala*⁷⁶. Baratieri acknowledged that the measurement, especially of height, tended to be inaccurate.

Another source used by Vaciago made the point that those who administered water in Piacenza used a measure that consisted of 108 *punti* (points), which was a squared *oncie* taken from the *braccio* measure of length. Any means of measure was inadequate to the needs of the management, as it failed to account for the real amount of water flowing through the water channel⁷⁷. The flow of the water was not constant in the channels; seasonal variations in the Trebbia itself would have affected water levels. The flow would have been further tempered by the decline in an individual water channel. A consistent

⁷⁵ 108 sq oncie at 3.9 cm/oncie is 35 cm x 49 cm or 1642 sq cm.

⁷⁶ Vaciago, Il regime giuridico delle acque di Trebbia nella storia, ‘La canala: una sezione di 108 oncie quadrate, ottenute moltiplicando 12 oncie di larghezza per 9 oncie di altezza, ma in realta . . . “non potendosi fare tale altezza di 9 a bisognano farla meno o piu, si aura da calcolare tale altezza secondo le proporzioni dei loro quadrati, alla forma delle regole”. . .’ quote from Baratieri on p. 10.

⁷⁷ Ibid., “. . . i piacentini usano misurare l’aqua a canale e fanno il loro canale di aqua con una sezione di 108 punti, o vogliamo dire oncie quadre del loro braccio, senza considerazione determinata, ne di altezza o larghezza, en dependente dai loro canale, moltiplicando solamente le dimensioni in quasivoglia modo trovate. . .” quote from Digesto Italiano, p.10

decline is assumed in the measures but that would have been unlikely due to variations in construction, settling of infrastructure over time, and uneven build-up of silt and other deposits in the channels. Reports on the water system after the Farnese era continued to find a major problem in management of the resource due to this lack of an accurate means to measure its velocity⁷⁸. One way to measure water levels within a canal was to mark the sluice gates so locks could be opened or closed accordingly. Vaciago comments that a 1790 commission used this method⁷⁹.

The problems with inaccurate water velocity measurements at Colonna flowed downstream to the city and its water users. Descriptors of amounts of water appear in *capitoli*, the infrastructure construction agreements, and licenses when the utility sold water rights to individuals and institutions, in letters from citizens to the commission, in complaints about insufficient service, in the reports made by engineers, and in some tax documents. Water rights were agreed upon and paid for through established concessions, that is, a license to construct a conduit from a canal to draw water. A particular measure of water was the concrete aspect of the water right, and it was important in how water was discussed by the committee and between the committee and its constituents.

In a *capitoli* dated April 1557, the dimensions for the excavation of a channel to deal with *rifudo* (waste) were given in length and width⁸⁰. In a license issued to Antonio Gulieri of the parish of San Nicolo de Cattanaï, on 23 May 1711, he was told that that his

⁷⁸ *Ibid.*, . . . gia 1653, l'autore a cui ho appena accennato, dichiarana: “. . . mi deve essere concesso che per misurare bene l'acqua corrente, faccia di bisogno la considerazione della velocita, terza dimensione, che serve di lunghezza necessaria alla misura del corpo dell'acqua corrente. Particolarita che sara forse nuova, non essendo stata fino ad ora osservata da chi misura l'acqua delle Trebbia, ne degli altri acquedotti del Paese. . . p11.

⁷⁹ *Ibid.*, . . . ' Per i rivi. . . provvisti al loro inizio di un'imboccatura con immissione dell'acqua a mezzo di paratoia regolata a mano e scorrente in opportuni incastri, fu considerato come regolatore tale manufatto di immissione. Regolatore portatile: la copia dell'acque che passava per le singole luci fu dalla Commissione determinata in base all'area delle luci e a norma della velocita attraverso le stesse luci; quest 'ultima valutata in ragione sudduplicata dell'altezza delle acque sulla soglia. . . p13. Cademartiri mentions in her examination of the early system from the Trebbia that a hydrometer was used to measure the water flow at Colonna in the 12th century. Cademartiri, Lo sfruttamento delle acque, 78.

⁸⁰ CSO 1-P1554-4.

new infrastructure connected to the Fodesta would have to have an inlet of 18 square *oncie* (274 sq cm) in size, large enough to clean the length of the channel. The length of pipe he wanted to lay was given as 33 *braccia* (around 15 meters) with a width of 4 *braccia* (around 2 meters)⁸¹.

Letters from inhabitants about water service sometimes included precise dimensions for pipes and wall openings. In 1612 the Capuchin Fathers wrote the committee about their water service. They described the canal that ran through their cloister and claimed that it needed two openings in the wall. The wall opening proposed was to have a dimension of 3 *oncie in circa*, or 11.7cm around. They implored the committee to allow necessary changes to the infrastructure to service their monastery⁸². The issue to be resolved between committee and monastery was not the flow of water but the size of the opening between monastery and canal which allowed for the flow of water.

The precision of dimensions and the discussion of water flow within the context of the technical abilities of the time come to the fore in the engineers' reports. In a report by Giuseppe Cremonese on 8 July 1693, he described a problem with the canal that served the monastery of the Annunciata and its White Brothers. He went to measure the height of the water in the canal and found it to be, at its highest, only 8 *oncie* (31.2cm) and the water was stagnant. Another measure showed 5 *oncie* (19.5cm) and a great quantity of earth inside which would have blocked the water flow. In this report, the issue of flow versus conduit size becomes clear, the conduit may have been ample but the flow was reduced either due to the earth within it or because it was high summer and the overall flow from the Trebbia could have been diminished. Cremonese did not comment on this second possibility⁸³. In another report on 29 April 1703 Giuseppe Cremonese responded to a request by householder Giacomo Peroncini. Peroncini lived alongside the Fodesta and wanted to enclose his courtyard with a wall that included a connection with the canal. Cremonese's report described the house location as close to the banks of the Fodesta with

⁸¹ CSO 18-F1709-41.

⁸² CSO 7-F1-23, ' . . . varabbe necessario il fare in quell sito un piccolo parapetto, o batiente di muro in lavezhezza, e alterza non piu di 3 oncie in circa, e pero riveventemente . . . '

⁸³ CSO 17-F1693-12.

a garden. The connection that the homeowner desired to the canal had to be large enough to accommodate the removal of earth from the canal and he gave the dimensions he thought adequate. Cremonese recommended that Peroncini be given the license as no harm would come to the consortium in charge of the canal⁸⁴.

Expense lists and bills given to the committee do not give area dimensions for pipes: generally the work is described in a dimension for length and a separate dimension for the width of the pipe or cavity. Contractors were concerned with the execution of the specifications given by the engineers, so actual flow allowances in conduits would not have been their purview. Tax documents also detailed the infrastructure to be funded, although this occurs largely in those documents late in the Farnese reign. A *compartito* in 1714 is typical of these later tax documents. The work to be funded included a piece of vaulting, a wall, paving, and a bridge located above the Rivo Beverora at the church San Giovanni in Canale, and the Croci delle Strade. Total costs were 160 *lire*, 4 *soldi* and 8 *denari*. The tax document involved three water channels that had 324 *oncie* (1.2 meters) distributed between an unnumbered group of openings. However each *oncie* was worth 10 *soldi* in tax fees. After this general introduction other individual pieces of infrastructure were listed and their value given relative to their size. A conduit from the Beverora near Porta San Raimondo and one with another opening that served the brothers of San Giovanni both had an inlet for water that allowed 11 *oncie* (43 cm). Four small channels are listed with their flow sizes for a total of 19 *lire* and 10 *soldi*⁸⁵. The precise dimensions of the channels allotted to the various users justified the taxation fees. This particular list of structures to be repaired appears again in a tax document by Bartolomeo Cremonese on 18 July 1717, with the same locations and total costs for the work. It is followed by a list of tax rates based on ownership of *bochelli* (inlets) and the *oncie* (size) connected to the inlet⁸⁶.

While pipe size was a proportional way of thinking about water usage, this problem with the water flow and the lack of measurement accuracy haunted the water utility to the end of the Farnese dynasty. It is tempting to believe that all was well, when in June 1726,

⁸⁴ CSO 18-F1702-4.

⁸⁵ CSO 18-1714-37.

⁸⁶ CSO 18-F1714-46.

the city initiated work on a new bed for Rivo Comune, work that was completed on December 1, 1727. However, the Austrians arrived in May 1736, and set about immediately to reorganize the ducal administration. Part of that reorganization involved the water utility and the way it functioned. The error in water flow measurement became glaringly obvious as reports evaluated the system for the ruler in Vienna. In 1738, according to Poli, the Austrian government investigated the management of water and found that the distribution was uneven and unequal and that the system carried a certain level of negligence and carelessness in its administration⁸⁷.

In a report dated 18 August 1739, Carlo Novati outlined the numerous problems with the management of the Trebbia water system. The major error was in the means by which the committee had used to measure water distribution. The *oncie quadrate*, the *oncie* squared, was inadequate as it failed to account for water velocity⁸⁸. Also noted in the reports were the irregular sizes of the inlets that made control impossible. The outcome of this disorder, noted in a report by Gianantonio Tocchi, also on 18 August 1739, was that the city used more water than it knew, in fact, more than double the agreed-upon 108 square *oncie*. He found an imbalance between the city and the surrounding countryside in the use of the canals and certain channels which privileged land uses outside the city walls. He compared the amounts of water available in canals inside the city walls and concluded that these had unequal amounts of available water due to different rates of decline. To make it all worse, he commented that inlets to smaller conduits were placed in such a way that unequal amounts of water were allowed in. Tocchi's solutions were to rationalize the whole system, regulate the inlets equally, make them all of like size, standardize how they were situated, use better measures, and to adjust the decline in the

⁸⁷ V. Poli, Le acque di Trebbia, 66.

⁸⁸ Carlo Novati, in Relazioni fatte a signori deputati dell' Illustrissima Comunità di Piacenza sopra i disordini correnti nella distribuzione delle acque di Trebbia e progetti per il loro riparo, 1739, p. 4 ' . . . Oncie quadrate: e questo e il primo errore, dal quale nascono differenze grossissime nella quantita d'acqua d'un rivo all'altro, dimodocche fe due Rivi devono avere ognun di loro una Canale d'acqua, spesso accade, che uno non ha tutta la porzione, che gli fi conviene, e' l'altro ne avra il doppio, e piu.' Available at BPL, Pall. Misc. 1e Misc. Landi 423.15.

canals to regulate flow to ensure better and more equal distribution of water⁸⁹. The third writer of the report to the government added that this dysfunctional system meant that the city had sold unequal and untrue amounts of water, especially during the dry season. The end result was insufficient water in the city⁹⁰. Spurred on by this obvious lack of order and inefficient management the Austrian-led government reorganized the whole structure of water administration in order to institute the suggestions of those who had investigated the arrangements, to make it a more just and measureable system. Poli comments that this reorganization was meant to address the relationship between public and private interests in the use of water from the Trebbia River, a problem which the Austrian government addressed again in 1740⁹¹.

4.3.4 Visualization of the Canals and the Evolution of Mapping

The maps of the canals and urban waterways evolved over the period of the Farnese rule. They became more precise; more detailed, and simply showed more of the city. Diagrams of smaller areas were also used by citizens and engineers to convey information on infrastructure over the course of the two centuries. The earliest maps are little more than city walls with the canals delineated as they flow across the urban landscape, many times streets are lacking. At times mills and/or churches are marked. These views are always in two dimensional plan view or with a perspective added to the drawing.

⁸⁹ Ibid, Gianantonio Tocchi.

⁹⁰ Ibid. F. Brignole.

⁹¹ Poli, Le acque di Trebbia, 75.



Figure 4-70: Plan view of the city. #202, Pianta prospettico – planimetrica delle città di Piacenza – disegno originale del sec. XVI, Parma ASPr, mappe 21/3, in nuovo 31.



Figure 4-71: Canals with simple blocks and city walls. BPL-M cass 7/9, 16th century.

Some maps tried to enumerate city landmarks and important features. This almost always included churches and mills. Some later maps detailed the urban infrastructure down to the major canal openings, a means of identifying and locating water rights.



Figure 4-72: Map of city from 1686 with detailed list of *bochelli* or canal offshoots, BPL-M cass 7/12.



Figure 4-73: Detail from above with list of *bochelli*, offshoots for the Beverora. BPL-M cass7/12.

While over time the canals and roads became more detailed in plans of the city it is interesting to see how further information was visualized and communicated. One of the major concerns for gravity-fed canals was the original and ongoing canal depth longitudinally along the run of the water channel. This became a part of some later maps as drawings were made of individual canals. These maps, though later than the Farnese period, also show, in the case of individual urban canals, how they ran below ground or remained open in the landscape.

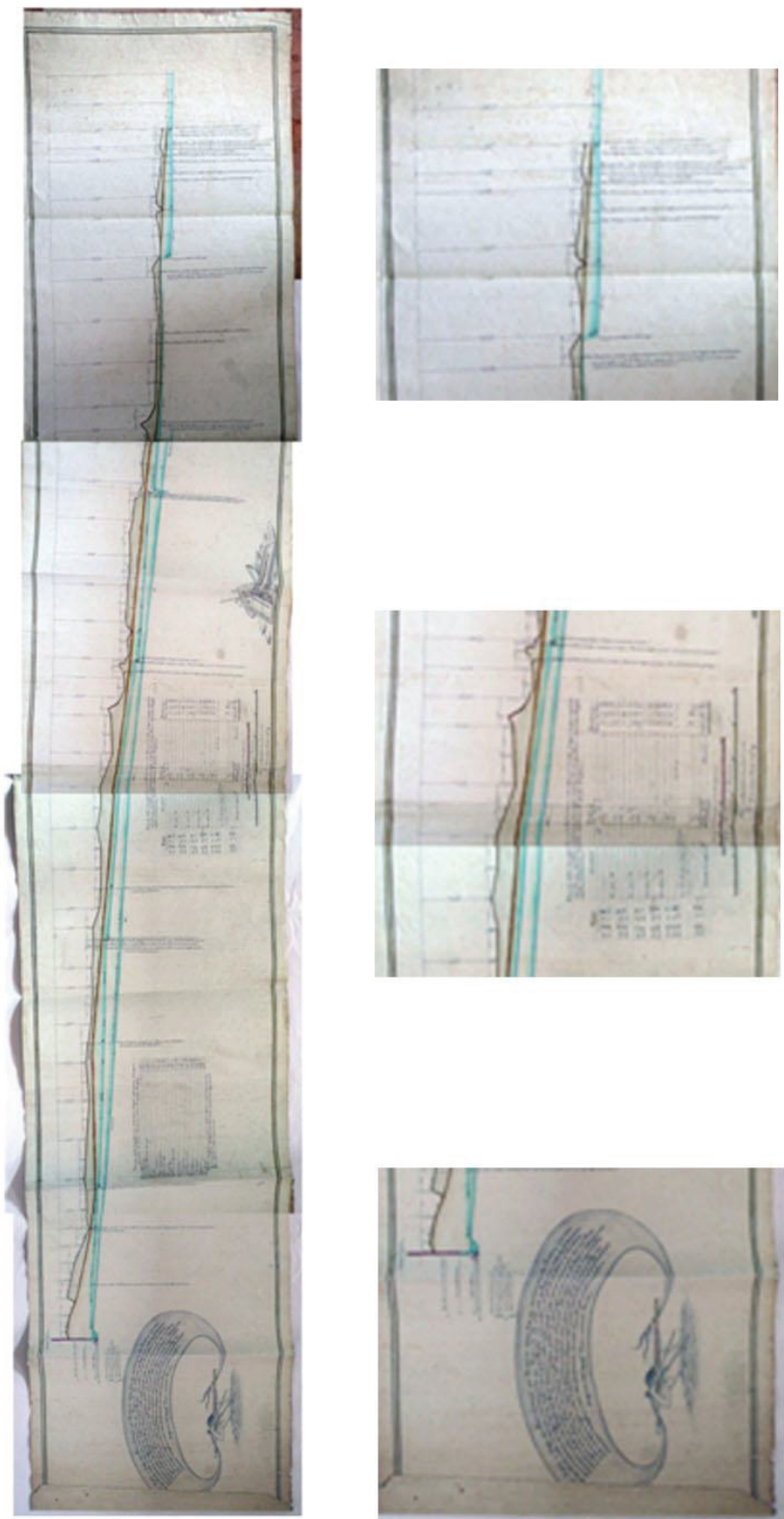


Figure 4-74: Profile del Rivo Comune, beginning at Trebbia and ending at Colonna with enlargements. ASPc, Nuova A: 6392, Busta: 5, foglio: 45, 226 X 41, 1741.

This particular map of Rivo Comune was an ambitious undertaking, to show the longitudinal elevation from its source at the Trebbia to Colonna where the water for the city was initially measured. Along the chart the canals and mills that fed off of this major water channel were located and marked. Depths were plotted along the course of the map to give an accurate picture of how the water channel worked. It was drawn in 1741, after the Farnese years.



Figure 4-75: Rivo Parente and Rivo Santa Vittoria, 1881. ASPc, Nuova A: 5780, busta 5, foglio: 25, 101 X 68.

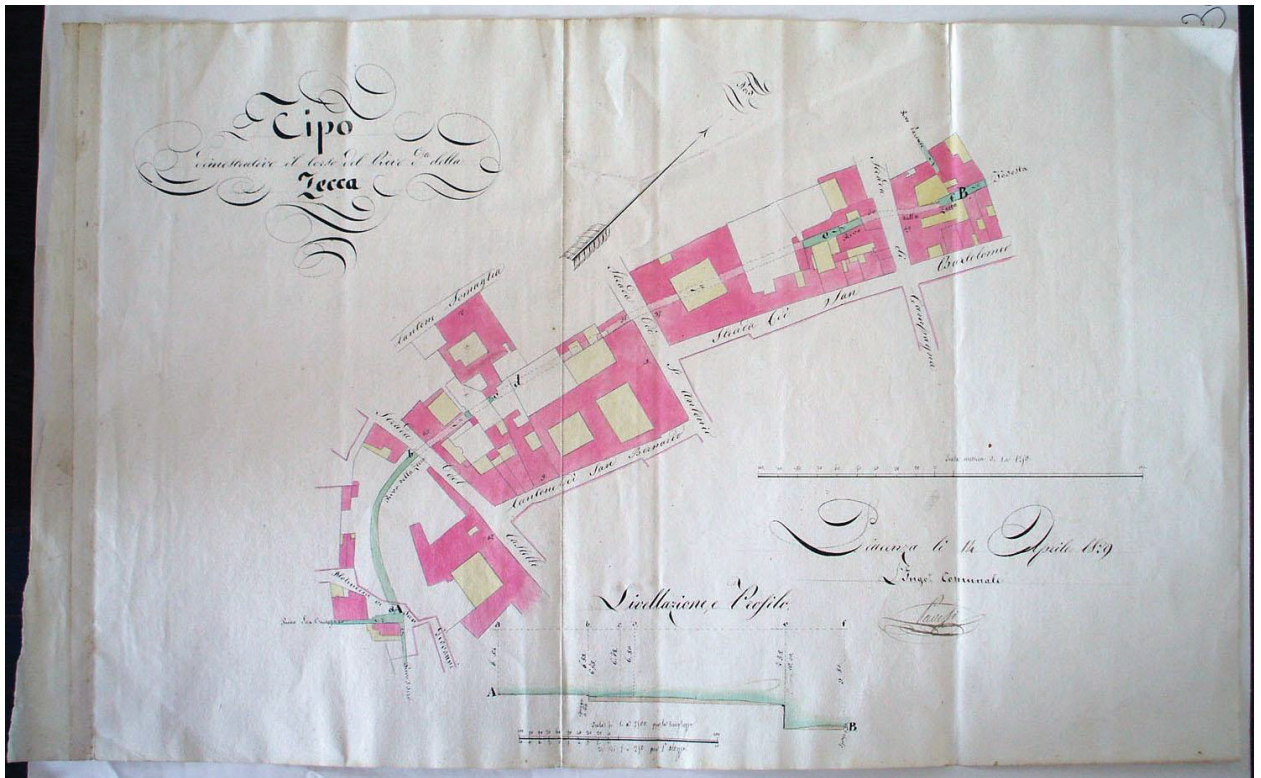


Figure 4-76: Rivo della Zecca, 1829. ASPc, Nuova A: 1384, Busta: 5, foglio: 32 49 X 30.

Also of interest are the many different diagrams of smaller areas found within the archive. They were drafted to offer clarity to the text by the engineers and were sometimes used in disputes. Such drawings allowed the committee to see in detail a proposed repair or change in the infrastructure.

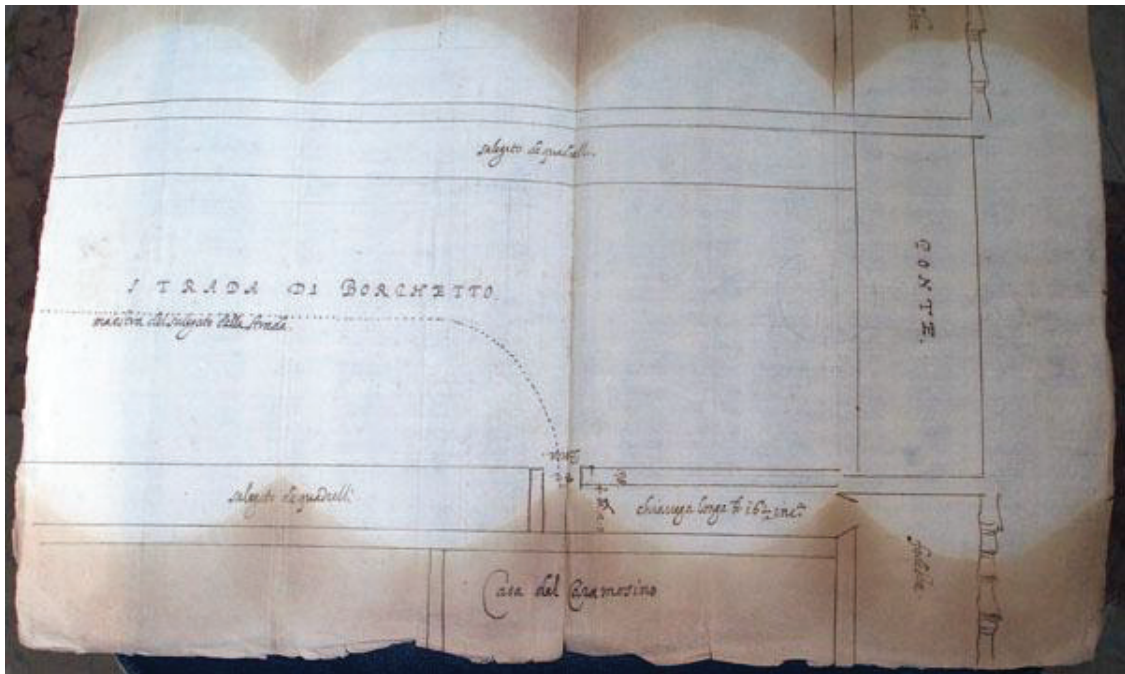


Figure 4-77: Diagram from 1619 of Strada di Borghetto with bridge, drain, and sidewalk. ASPc, CSO, busta 7, fasc 2.

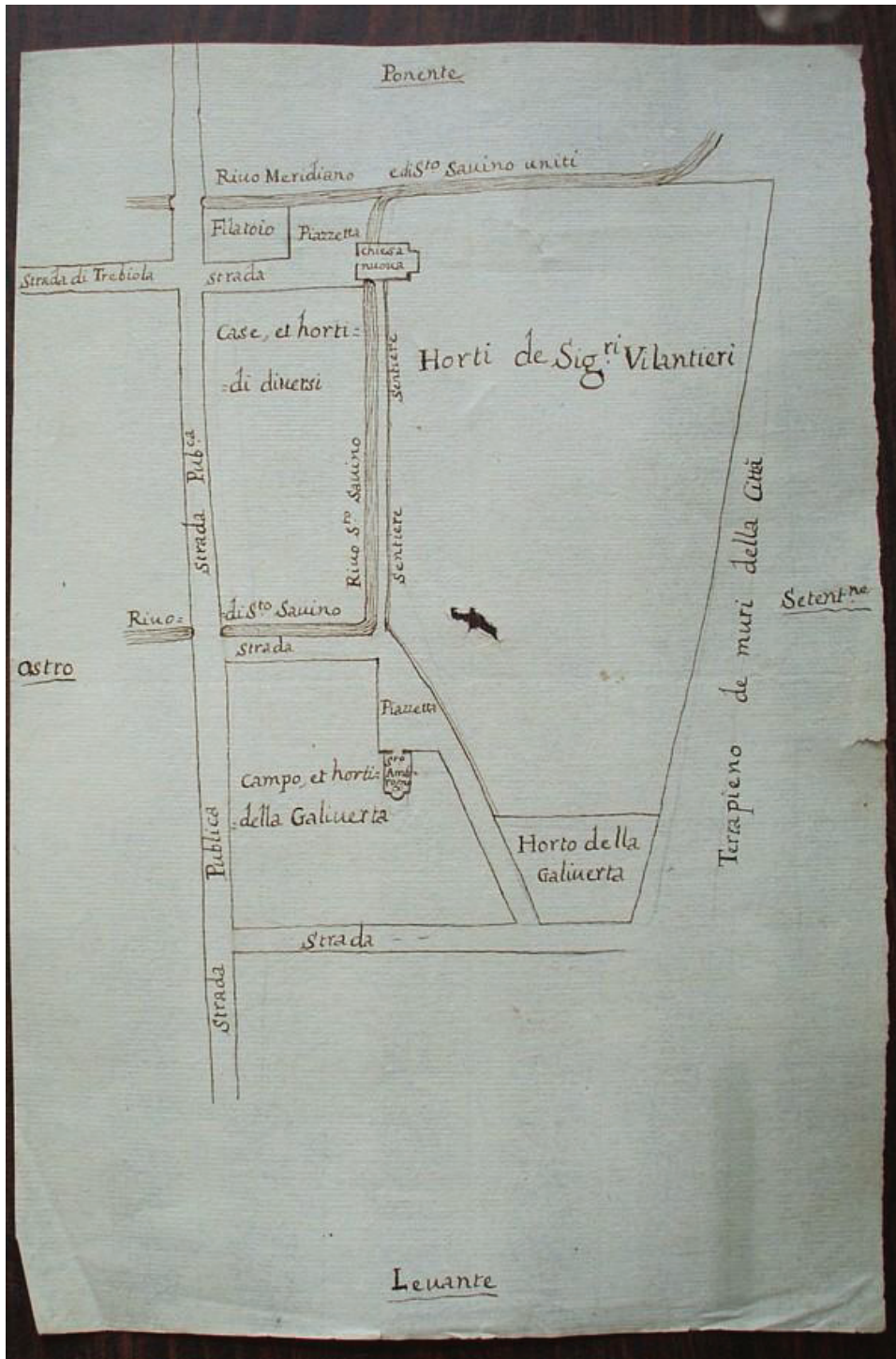


Figure 4-79: Diagram by Cremonese, the city engineer, from 1694 that shows Rivo San Savino and Rivo Meridiano where they join in the northeast end of the city. The dispute for which this diagram was drawn was over access to a path between the gardens. It makes clear the location of the ducal *filatoio* (spinning factory) at top left. CSO busta 17.

CHAPTER 5: ANALYSIS OF CSO ARCHIVE IN RELATION TO THE URBAN FORM OF PIACENZA

Charles Fishman, in his book on water, claims that we use politics, economics and language as tools to manage conflict and scarcity¹. The water system in Piacenza had seasons of plenty and of drought which created times of water abundance and times of scarcity. The city itself, at the time of the Farnese, was unevenly provisioned with water spatially and seasonally. Thus politics, economics and language became the means to manage the system. These means of resource administration should be visible in the landscape and create ecosystem patterns that inform us of the organization of the system and its outcomes.

5.1. Spatial Analysis and Land use Patterns

When humans began to drain the wetlands around what became the city of Piacenza, they encountered and irrevocably changed a dynamic ecology that managed water in both high and low seasons. Natural marshes and wetlands hold the water and discharge it slowly downstream. To drain the marshes and channel the water into human-made water courses meant that, in times of water abundance, flows would have been increased and sped up. Floods would have become a problem and perhaps made the system more difficult to manage than when water levels were low. As the human-generated system grew, it had to account, through politics, economics and language, for the dynamics of high and low seasons. Some of this was done through the process of organization with negotiated leadership and powers. Some was achieved through the grant of water rights and responsibilities that covered such a wide variety of water-based activities, while shifts in language documented, with increased precision, the needs and demands on the system.

In the long process that involved the development of politics, economics and language, the ecology of the lower Trebbia plain was altered. The system dynamics then depended upon constant and consistent human intervention and management. Locks had to be

¹ C. Fishman, The Big Thirst, the secret life and turbulent future of water, (New York: Free Press, 2011), 23.

opened and closed at the right time to suit human needs first but also to respond to level fluctuations, especially in rainfall events. The infrastructure had to be maintained, repaired, and augmented when necessary to contain and direct water flows. While the Roman blocks and urban design requirements determined the initial settlement of Piacenza, it is the canal system that shaped the city as it expanded. The waterways established where industry could locate. The channels decided the need for other infrastructure, such as bridges. The location of the rich and poor, the sites of gardens, mills, industries and artisans all depended upon the canals.

For the purpose of this spatial analysis, the urban morphology will be discussed in the context of Giorgio Fiori's work on the urban space, which he based on a 1737 *elenco*, a census of the city businesses and residences just after the Farnese reign. In his work, Fiori divides the city into four historical quarters.

1. The first quarter ran from Porta San Raimondo (today Barriera Genova) along Via San Antonino (today Corso Vittorio Emanuele II) and then turned up Via Guasta (today Via Garibaldi) to the Piazza del Borgo; it then turned to run along Strada Levata (today Via Taverna) to the south edge of the city. This quarter was the smallest in land size and contained the ancient church of Santa Brigida and the important Dominican establishment of San Giovanni di Canale. It was historically associated with the Scotti family, whose multiple branches maintained several palaces there. The Rivo Beverora entered the city and ran through this quarter along with its many derivations and offshoots. Because this quarter was on the west edge of the city, it also contained several large convents and monasteries.

2. The second quarter ran from Porta di San Raimondo along Via di San Antonino then it turned and ran down Via San Salvatore (today Via Scalabrini) to finish at Porta San Lazzaro (today Barriera Roma). It was the quarter historically associated with the Anguissola family and included the first important basilica of San Antonino and many larger convents and monasteries. It contained the entrances to the city of Rivo San Savino and Rivo San Agostino (Rivo San Siro). As such it was on the upstream and cleaner end of these water channels.

3. The third quarter of the city was the largest. It ran from Strada delle Saline and Strada Crosa (today Via Cavour) to the northwest. It pivoted across the Largo Battisti, the small piazza west of San Donino to a western boundary along Strada Levata. It was the domain of the Da Fontana family historically. The Palazzo Farnese was located in the north end of this quarter as was the monastery at San Sisto. On the other side of the city, the large convent and orphanage of San Sepolcro was part of this quarter along with the pilgrimage church of Santa Maria di Campagna. This is a quarter full of monasteries and convents as well as industry. It was a water-rich quarter with canals that entered the southwest edge of the city like Rivo Parente and Rivo Santa Vittoria, and it gained offshoots from the Beverora, such as Rivo Piccinino and Rivo della Zecca. The lower end of Rivo Beverora, the old Rivo San Sisto and all of the Fodesta also ran through this area towards their exit from the city at Porta Fodesta.

4. The fourth quarter of Piacenza was associated with the Landi family and the convent of San Lorenzo. Its boundaries were San Salvatore, piazza San Antonino, via San Antonino, Strada delle Saline and Strada Crosa all the way out to what was the Fiere dei Cambi, the site of the banker and credit exchange fair held for many years in Piacenza. This quarter included the lower end of Rivo San Savino and its namesake church and monastery, the lower ends of Rivo San Agostino and the Meridiano and the exit point of all canals at Porta Fodesta. This is the quarter where Palazzo Madama for the Farnese duchess was established next door to San Lorenzo. The cathedral was also in this quarter.

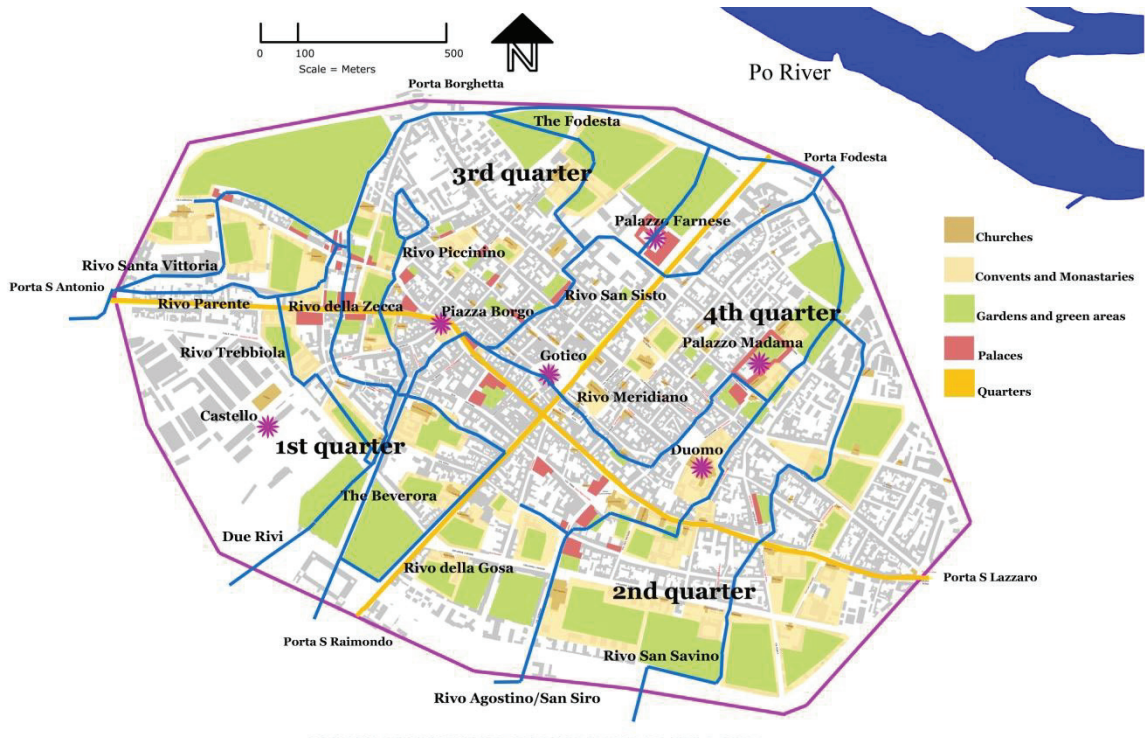


Figure 5-1: City with walls, quarters, gardens, palazzi, churches, and convent/monastery lands marked.

5.1.1 The Canals and the Urban Form

While the major roads that radiated out of the city served the countryside and created access for travellers and pilgrims, it is clear that the actual urban development beyond the initial Roman blocks was at least partially driven by the location of the canals. Because the canals were gravity-fed there was only so much leeway on their location. Certainly some of the canal locations depended upon who paid for the construction, such as the monastery of San Savino and its canal Rivo San Savino or the monastery San Sisto and its canal Rivo San Sisto, but even then they were constrained by topography. As the walls advanced outward, more and more of the system came inside the walls and made new land available for development for activities that depended upon access to the canals.



Figure 5-2: Wall extensions based on Racine with final Farnese walls added by author. Pierre Racine, *Plaisance du Xème à la fin du XIIIème siècle*. tome 1 (Lille: Atelier Reproduction des thèses Université di Lille III, Paris: diffusion H. Champion, 1980, c 1979), 4.

The various wall extensions took in more and more canals and their vital mill facilities over time. But the real prize, the canal-rich area northwest of Strada Levata, came into the city late. Fiori comments that Porta San Antonio was constructed in 1530, after the walls were extended to take in the great shrine of Santa Maria dei Campagna in 1525. For a long while, many of the mills and canals were just outside of the city walls. It is beyond the scope of this research to know if the factionalized politics of the urban government had an effect on wall extensions in the Middle Ages. Construction depended upon allocation of funds, something that could have been politically charged during a divided administration. Did the factionalized governance determine how the walls were extended and where and how canals and their productive facilities were brought inside into politicized space?

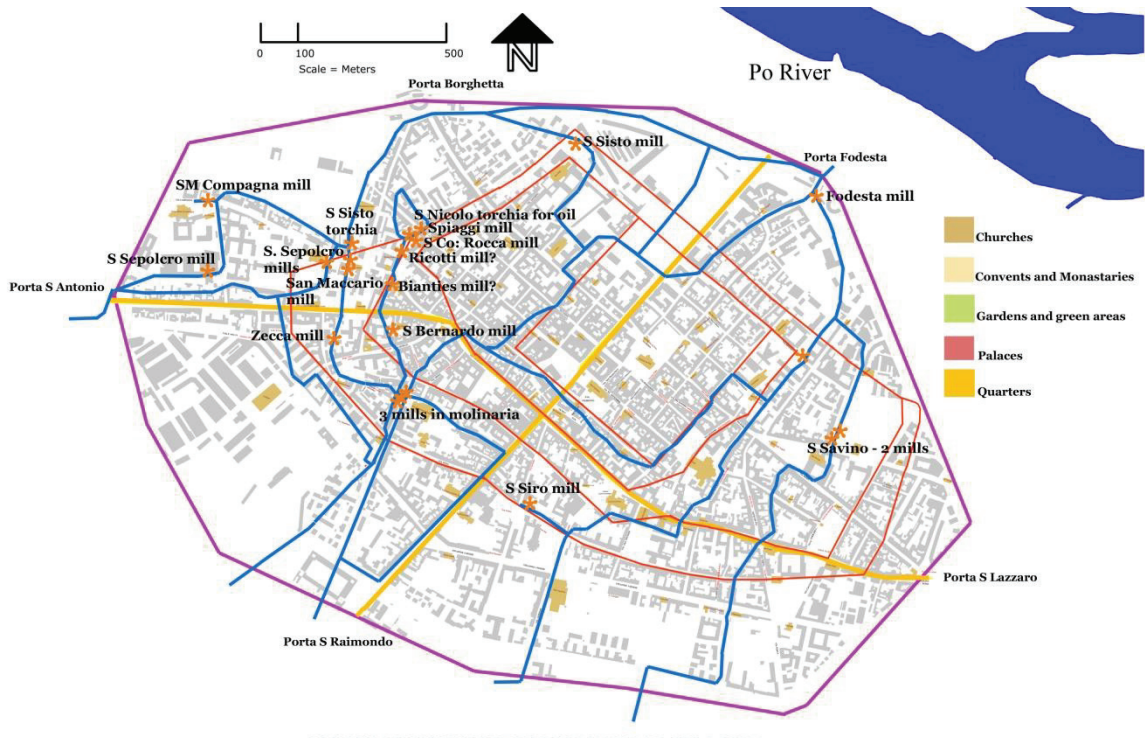


Figure 5-3: City wall extensions with canals, Fiori’s quarter divisions, mills and gates.

The city council continued, under the Farnese, to be structured according to the quarters and the names of the ruling, noble families. However, the administration of the canals appears to have been a city-wide effort. There is no evidence in the *convocati*, the minutes of the CSO, of factionalized, party-based decision-making. At the same time, it has to be acknowledged that the minutes of the meetings are brief and do not take in the process of decision-making except to record final recommendations. Thus, while there is little evidence that divided politics influenced canal maintenance and repairs during the Farnese era, the lack of evidence overall leaves the question open. The Farnese reform of 1585 reduced the power of the Landi family over the larger Trebbia water system, and in that situation, it minimized divided administration of the urban canals.

Because the canals were a necessity for mills and water-driven production, and at the same time desirable for urban agriculture and gardens, the convents and monasteries sought to be located along watercourses built by themselves or the city, even when they were located outside of the city walls. As the walls extended they took in more of the

church institutions that had established themselves in the suburbs. These institutions had already established the land use patterns for the area through their own mills and irrigated fields. Overall these patterns remained on the outer edges of the city along the Farnese wall.

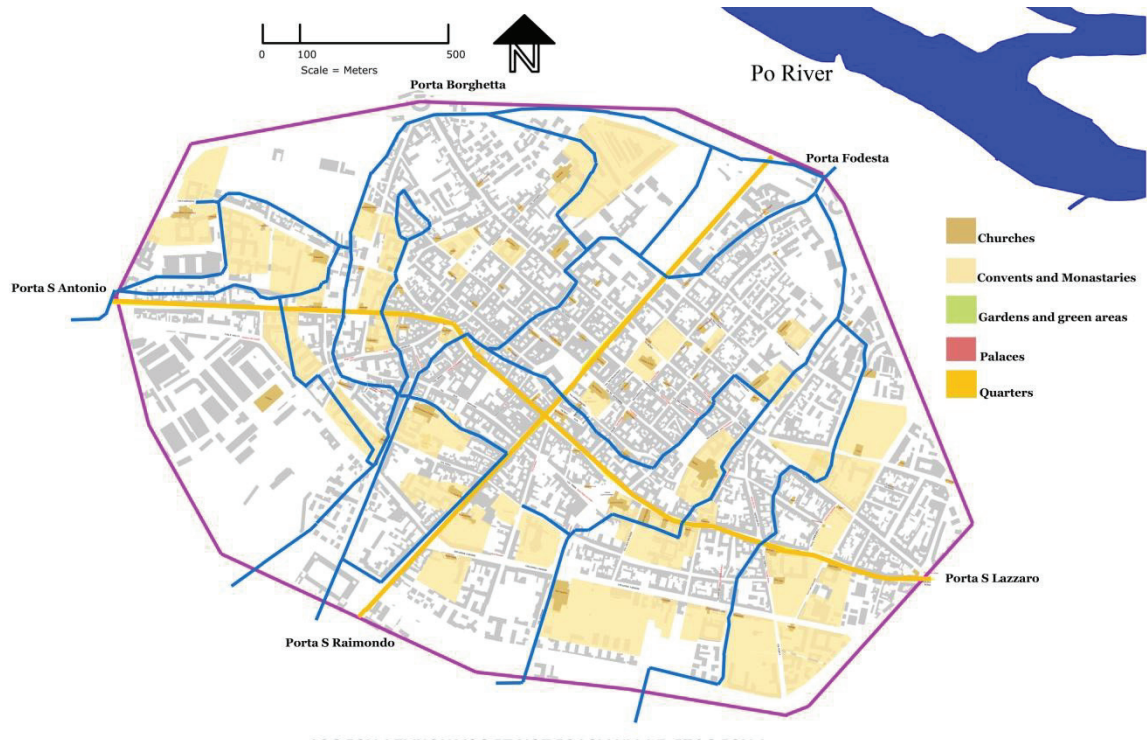


Figure 5-4: Convent and monastery properties with major canals. The ecclesiastical institutions off the system may well have been served by wells or smaller conduits not mapped

When the Farnese walls were built the feudal nobility were required to live within the city so land had to be developed for their palaces. Overall they fit their new residences within the existing land use patterns with a preference for water-serviced properties. The result is that the noble palaces of the Farnese era often ended up quite close to older, existing mill facilities.

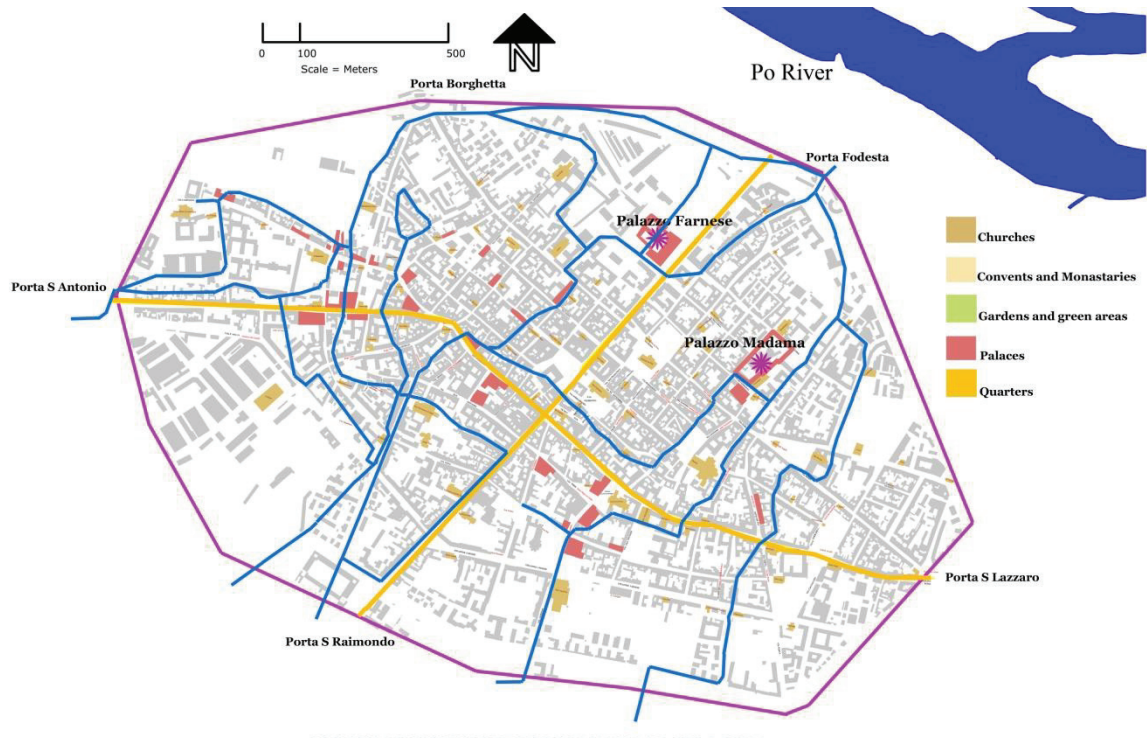


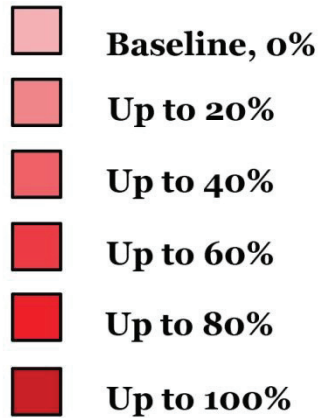
Figure 5-5: Palaces for principal nobles including Palazzo Farnese and Palazzo Madama with canals. Note: there were many more minor nobles and their palaces in the city but mapping those was beyond the scope of this study. The ones mapped come from Giorgio Fiori, *Il centro Storico di Piacenza, palazzi, case, monumenti, civili e religiosi*. Tomo 1-6. (Piacenza: TEP, 2005-2008).

5.1.2 Farnese *estimi*

Marzio Romani examined a series of documents from the end of the 16th century, which allowed him to analyze the population dynamics of the city. He looked at tax documents (*estimi* and *compartiti*) and was able to analyze the distribution of wealth spatially within the city, along with the location of various merchants and artisans. His material, listed by parish, enables a spatial analysis of land use patterns and how they related to the distribution of canals within the city².

² Marzio Romani, *La gente, le occupazioni e i redditi del piacentino (da un estimo della fine del secolo XVI)*, (Parma: Editrice Nuova Step, 1969), 58-63.

The following set of maps takes the parish by parish information from Romani and imposes it on the urban space, divided into quarters by Fiori, to give an overall picture of the distribution of population, wealth and varied land use activities within the city based on residential demographics, work and business activities.



Colour code for land-use maps

Fig 5-6: Colour code for land-use maps. This colour code is a visual map of the percentages of different demographic groups within the different urban quarters. For example, if there were 20 millers overall, they might divide up with 20% of them in one quarter of the city and 60% of them in another quarter. The increasing intensity of the colour indicates a higher percentage of the group under discussion in a particular quarter of the city.

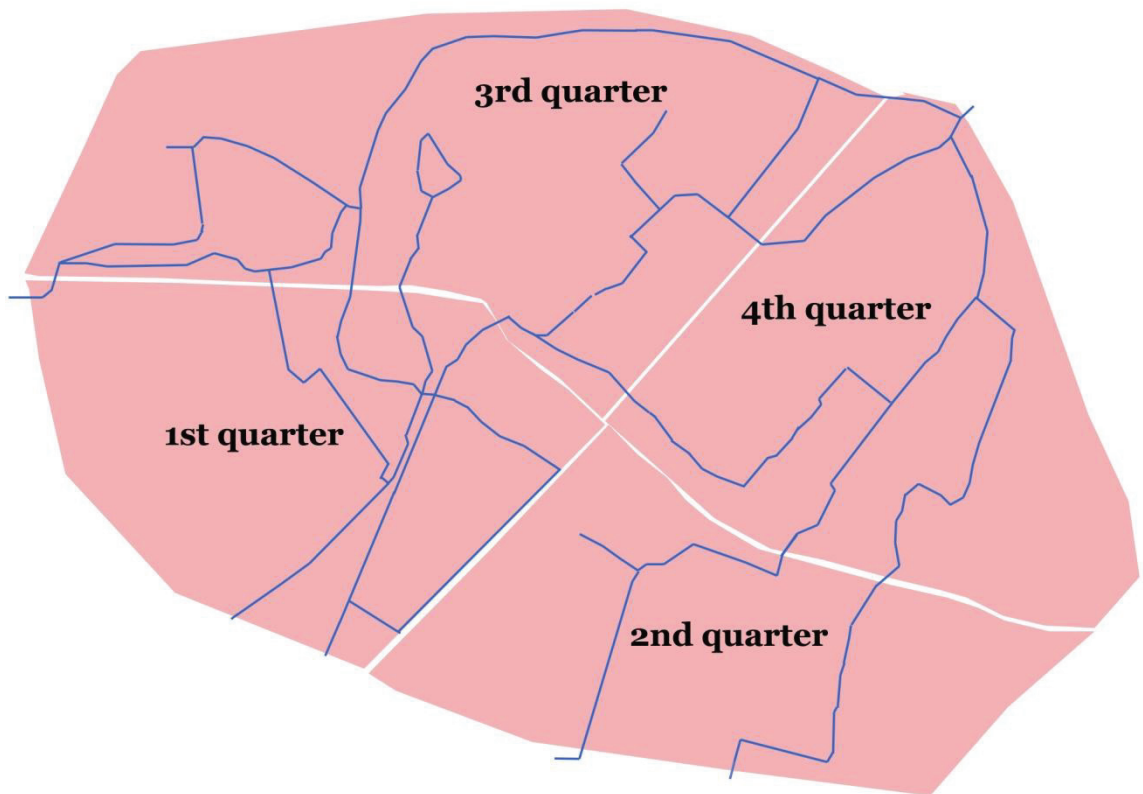


Figure 5-7: City quarters with canals and base colour of 0%.

Demographics of wealth, artisans, merchants

Since the canals provided energy for industry as well as water to irrigate the many urban kitchen gardens, it is vital to understand the spatial distribution of wealth within the city. The high income areas appear in 3 clusters. The first lies between the Duomo and the Gotico, an area of the city today that still includes the major shopping street. It was first of all an area of merchants, and it was served primarily by 16th century Rivo Meridiano. Here the Meridiano ran through backyards and courtyard gardens until it took its turn north near the Duomo. It also serviced San Lorenzo and Palazzo Madama as it headed north to Porta Fodesta. This is not an area with large palaces, which came later, further out from the centre.

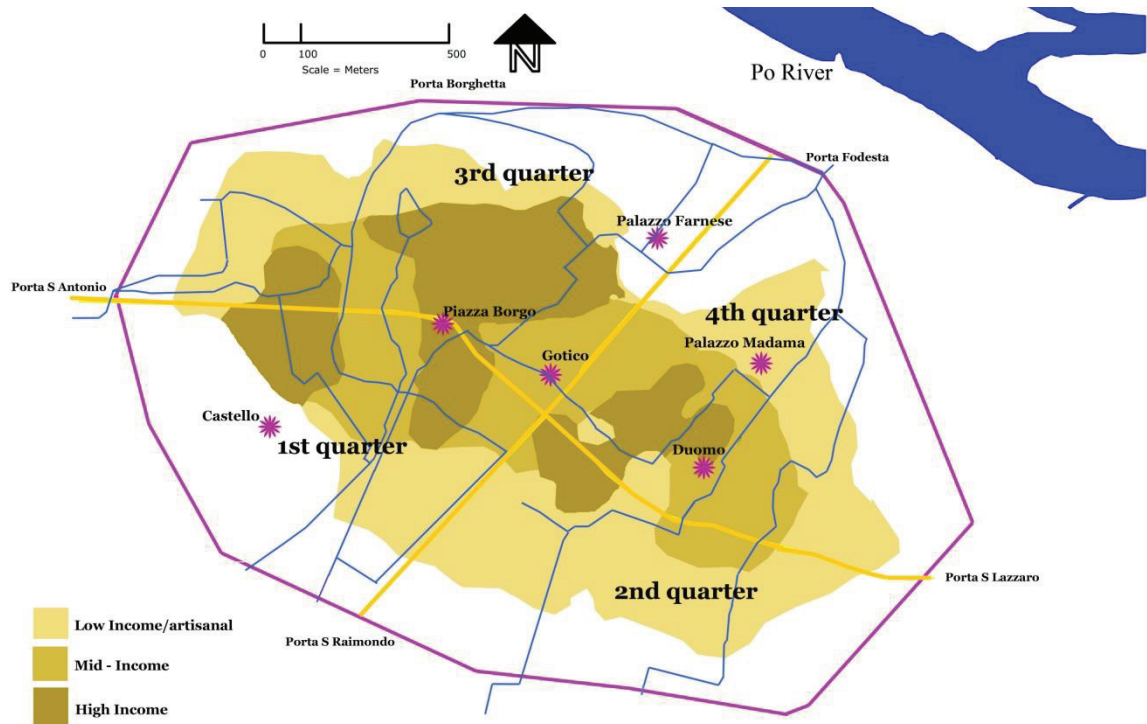


Figure 5-8: Romani's demographics of wealth superimposed on map of canals, with city quarters and major locations marked.

The other two areas of wealth are indicative of urban extensions. The first extension from the Roman core was to the west into the 3rd quarter. Here some larger palaces are more visible along with their courtyard gardens. On the edge of this area sat San Sisto with all of its wealth and influence. While not visible on this map of the major water channels, there are small channels that ran from the canals through this area to provide the residences and mills. The 3rd area of wealth, to the southwest edge of the city by the *castello*, had clear access to several canals. Ultimately several large palaces were built in this part of the city and to the west of the *castello*.

Interspersed between the areas of wealth were areas of more middle income. These areas were still focused on the centre of the city but took obvious advantage of water provisions. The lower income areas surrounded the centre as was typical in Italian cities. They were located often in water-rich areas and industrial locations. However, this map and the *estimi* upon which it is based failed to take into account the ecclesiastical

institutions and their populations or wealth. Many of those institutions were located along the edges of the city and are better represented through land use maps that show the location of green areas and urban farms.

Do Romani's figures match up with evidence from the CSO? Sometimes in a communication to the committee, the writer would describe themselves as poor and unable to fulfill the tax obligations required for water service or in desperate need of the return of their pledge since the obligations had been fulfilled. But pleas of poverty are actually quite rare in the archive over the course of the 200 years. A total 16 *memoriali* in that time period contain expressions of self-defined poverty. Not all give a precise location and cannot be accurately mapped and not all involved canals or canal maintenance. One dealt with paving, six involved canal cleaning and maintenance, three related to maintenance on a well or cistern, one had to do with sewage in the street, one requested a reduction in water utility fees, three were about rainwater management and possible connections to a canal, and the last one had to do with a license to build a wall.

Out of the 16 letters, five are from women, one from a male writer who also named his wife, one from heirs to a father who had water rights that required payment, and two are from groups of people. One group consisted of four seemingly unrelated males who shared a house. The other was a large group of co-signers who were in dispute with the Madri Scalce, the Discalced Carmelites, about water issues³. One writer identified himself as a miller, most likely a tenant of the mill owner, and one identified himself as a gardener. Locations mentioned include: Rivo San Savino, Rivo San Sisto, Rivo San Agostino, Rivo Beverora, the parish of San Martino although, it is not clear whether this is San Martino in Foro or San Martino in Borgo, Cantone del Tempio, San Stefano, and one that located himself on Strada Levata at Rivo Parente⁴. A map of the locations that can be surely placed or even approximately placed is inconclusive with such a small sample, though it appears to support the location of low-income households. The writers

³ The Discalced refers to an order that goes barefoot or only wears sandals. The Discalced Carmelites, an order focused on silent prayer in the hermetic tradition was formed in 1593.

⁴ Memoriale that mention poverty are: CSO 2-F2-14, 7-F1-30, 8-F2-128, 8-F2-4, 8-F2-18, 9-F2-22, 9-F2-31, 9-F2-34, 9-F2-38, 9-F2-54, 10-F2-44, 17-P1689-12, 17-P1689-14, 17-F1690-28, 18-F1709-10, 18-F1714-7.

of these letters pled poverty based on payments required for water service that included water piped into the household, maintenance of *pozzi*, maintenance of the canals, and courtyard drainage. None of these writers represent the urban residents who, due to an inability to pay any fees, lacked all water service. Those people remain invisible in this archival record and on the map. However, those people may not have lacked water provisions. Those too poor to pay for household service overseen by the CSO may have been served by communal wells or shared private wells.

Mill locations

Mills needed water, and often the mill owners or the tenant millers lived on site. The distribution of millers within the city should correlate with the location of the waterways. While overall the map appears correct, there is a problem with the number of millers listed for quarter #4 in Romani's work. Thirteen millers out of a total of 51 for the city were located in the parish of Santa Maria dei Pagani along the road that led to Porta Fodesta and the exit from the city to the Po River. This doesn't make much sense in terms of urban waterways, unless these were the men who managed the floating mills located in the Po River.

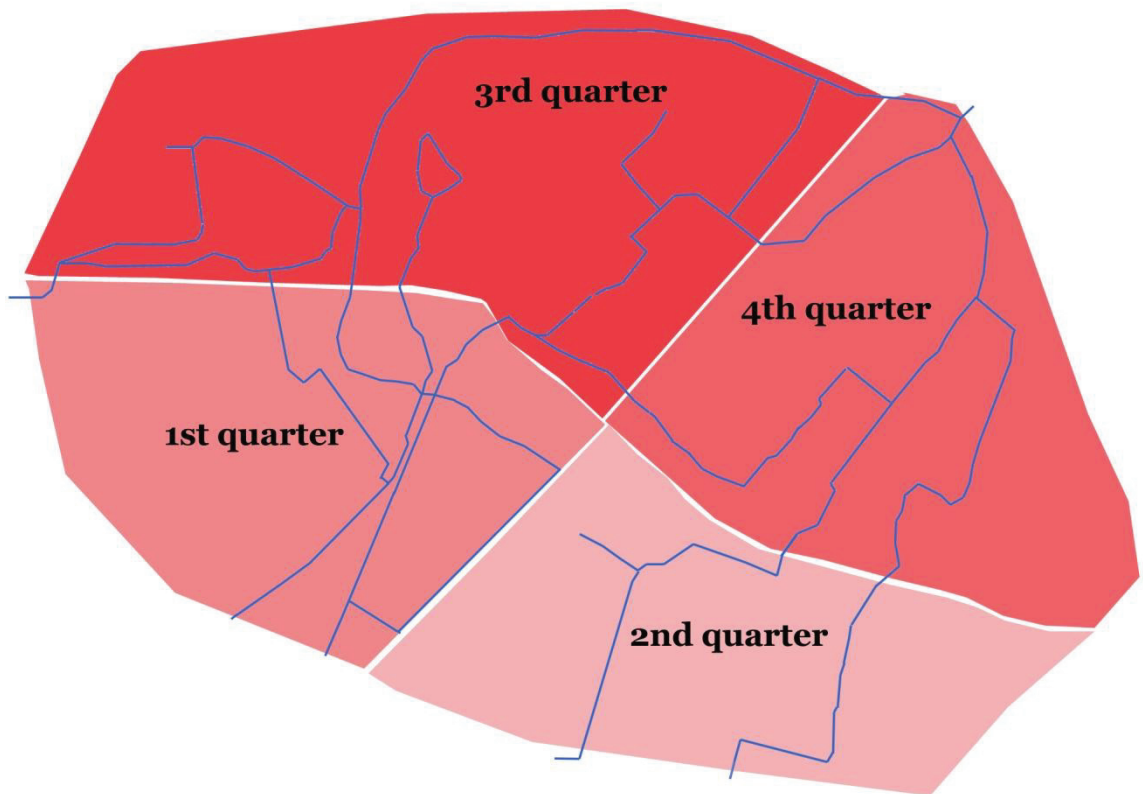


Figure 5-9: Distribution, by percentage of millers in the city including those that managed floating mills on the Po River. Quarter #1: 14%, quarter #2: 0, quarter #3: 51%, quarter #4: 35%.

If those 13 millers are removed from the count because they did not use water from the canals, then the distribution looks somewhat different. The 3rd quarter was the area where most millers and most of the urban mills were located. There is still the possibility that some of the millers left in the sample were amongst those who worked the floating mills on the Po River but it is impossible to differentiate them with the information available.

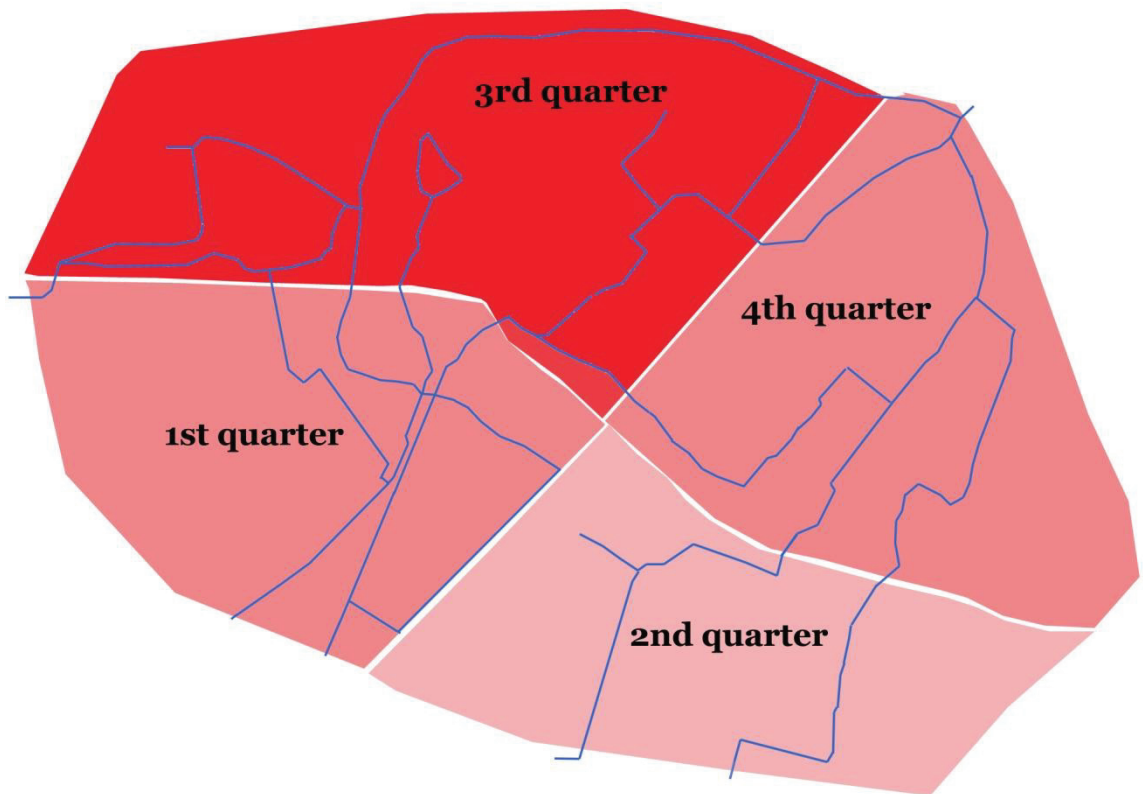


Figure 5-10: Percentage of millers by quarter with the 13 at Santa Maria dei Pagani excluded. The percentage for the 3rd quarter rises significantly in relation to the other quarters. Quarter #1: 18%, quarter #2: 0, quarter #3: 68%, quarter #4: 13%.

Another form of water-driven grinding were the oil presses. There were a total of five *oleari*, men who ran the presses, located in only two of the quarters. According to Romani's work there was one *torchio* in town, a press operator also located in the parish of San Salvatore at the extreme east end of quarter #2. Due to its location this press could have been animal powered.

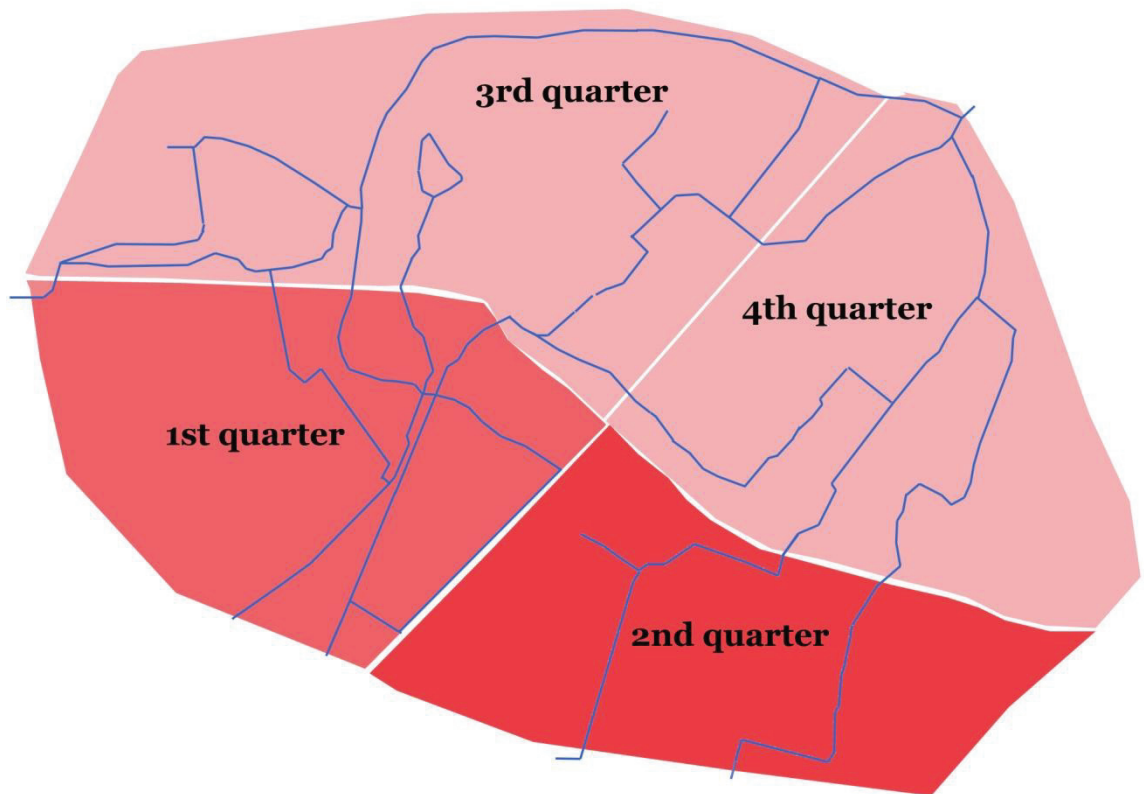


Figure 5-11: Percentage distribution of *oleari* in the city. Quarter #1: 40%, quarter #2: 60%, quarters # 3 and 4 had no *oleari*. It is probable that these kinds of locations were originally outside of the city walls and came inside with wall extensions. The single *torchio* was located on the border of the 2nd and 4th quarters in San Salvatore, at the lower right of the map.

One way to understand land-use inside the city walls is to compare the actual mill locations as mapped by historical maps with the distribution of millers, *oleari* and *torchio* in the city.

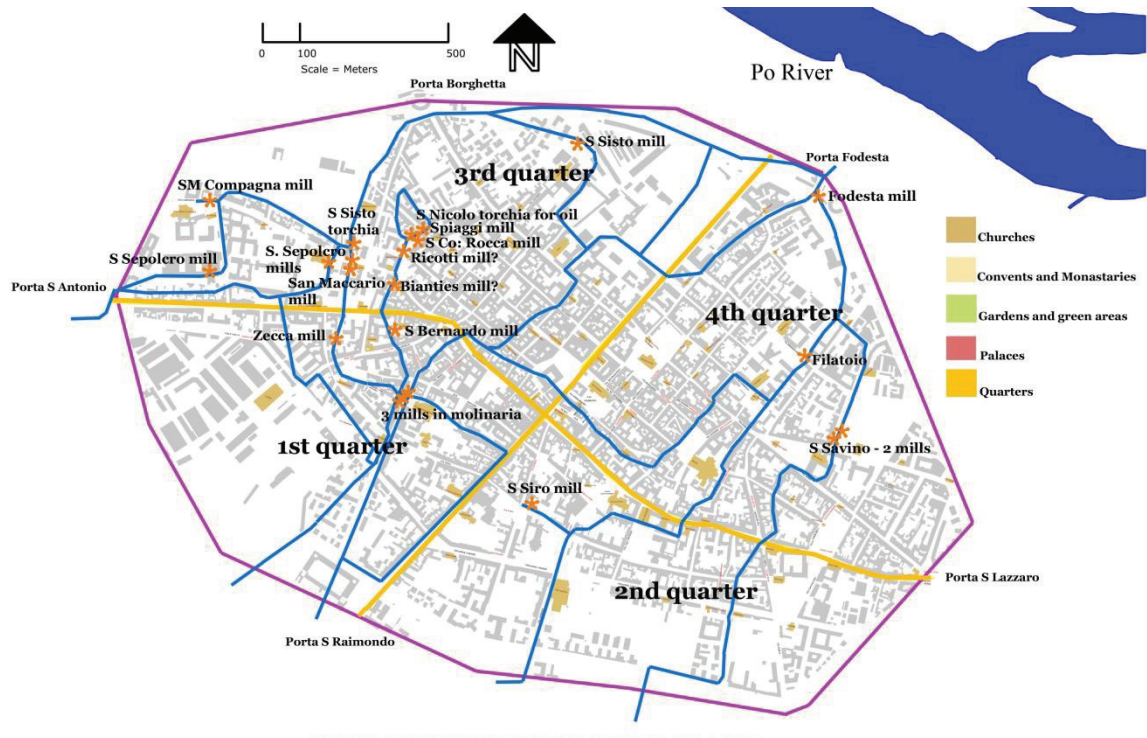


Figure 5-12: Map of canals with mills and city quarters. Based ASPr-M. Vol 22, #1, 18th century.

In the above figure it is clear that the mills were mainly clustered in quarters 1 and 3. This raises questions about the *oleari* found in quarter 2. It is possible they worked at facilities just outside the walls, or at smaller facilities that did not make it onto the historical map, or they were seasonal and animal powered. One document within the archive references a mill for oil located in the valley of San Sepolcro along Rivo Santa Vittoria in 1714,⁵ over 100 years after the documents in use by Romani.

Fiori's work also mentions mills at various locations. Did the 1737 property list (*elenco*) confirm the mill locations from the map? Fiori comments that Strada di Fossadello, in the 3rd quarter had 3 mills located along the street in the parish of San Giacomo Maggiore and San Matteo. One of the mills adjoined a house and belonged to the Ospedale Civile, another of the mills on that street was also connected to a home. These are present on the historical map used as a source for the mill locations in figure 5-

⁵ CSO 18-F1714-60.

12 above. Also in the 3rd quarter in Vicolo San Andrea, Fiori posits a mill near the monastery Spirito Santo. This may refer to the mill di Bianties on the map. He places a mill for the monastery of San Sepolcro along Cantone San Nazaro, which again corresponds to the map. Fiori places a number of mills along Vicolo Molineria San Nicolo in the parish of San Nicolo dei Cattanei near the Scalinata detta Montata dei Ratti. This is possibly a reference to the several mills and the *torchio* along Rivo Piccinino that are near San Nicolo dei Cattanei. He also places a miller's home on Via della Torricella at the intersection with Viale dei Mille or Cantone delle Orfane in the 4th quarter. In his discussion of the Cantone delle Orfani, Fiori notes there might have been a mill in the area. This is not supported by the historical map nor is it supported by the location of the major canals. Overall Fiori's work does agree with the historical map. Both show that it was the 3rd quarter that supported the majority of mills within the city. This was due to the abundance of canals there and a topographical level drop down to where the Fodesta was located.

There is the special situation with the *filiatoio*, an industrial facility that spins silk for textiles. According to Carmen Artocchini the first artisanal system to produce silk thread was developed in 1500 though the city had a long history, from the 12th century, of textile production. There was a strong desire to create a silk trade in Italy to circumvent trade from the east but it required the cultivation of mulberry trees to feed the silkworms and large scale investments in textile production. While Artocchini notes silk production was introduced into Piacenza during the Renaissance, the impulse to systematize production into an extensive and well-organized network was new. Although the introduction of organized silk production is often attributed to the first Farnese duke, Artocchini notes the existence of documents that testify to industrial initiatives prior to the Farnese take-over. Municipal authorities were dealing with silk production in 1528, 1529, 1532, 1537 and 1544. At that time there were merchants producing silk in the city and working to get mulberry trees planted in the countryside⁶.

⁶ Carmen Artocchini, Appunti per una storia dell'industria tessile piacentina, Edito a cura della Camera di Commercio, Industria, Artigianato e Agricoltura di Piacenza (Piacenza: Tipografia Fogliani), 7-11.

Paola Subacchi supports this information and contends that a building to spin and dye silk was constructed before the arrival of the Farnese duke, possibly in 1542. Other industrial facilities followed during the early years of the Farnese reign, especially as economic policies were created to favour the business owners⁷. The first reference to a *filatoio* in the CSO documents is in a legal case from the 26 October 1555 that involved Rivo Piccinino and Rivo San Agostino, a family named Zanino, irrigation, water rights and a *filatoio* for spinning silk⁸. This would support both Subacchi and Artocchini.

In 1678 Duke Ranuccio Farnese II created a large *filatoio* in the neighbourhood along Via Trebbiola, east of Palazzo Madama. Artocchini comments that this facility was considered unique in all of Europe and employed several hundred people though it was most likely modelled on similar facilities elsewhere in the Po River valley. The establishment of this industry in a time of economic decline was accompanied by increased and continued restrictions on how silk fabrics from other places were traded in the territory. The new or grand *filatoio* was a large undertaking and provided work for 700 persons in Piacenza though this might have been seasonal or part-time. Artocchini notes that the building was beautiful and the business prospered for several years⁹. Poni adds that the mill was typical for the Po valley and was indeed modelled after facilities in Bologna. After six years the business was acquired by merchants Pietro and Antonio Tondù and not sold until 1759. Poni asserts that while the mill was a very large one with mechanical winders and benches for a large number of operators, it never really operated at capacity but did employ 36-40 youth at 30 *soldi*/day. His worker numbers range from a low of 135 to a high of 300 but adds that over 850 people were supported by the company in the 1760's. Unfortunately, Poni contends that the mill was not a money maker¹⁰.

The CSO would have had to deal with the water provision to this facility. And in 1686 there are two documents, a letter and a report by engineer Giuseppe Cremenose, about the

⁷ Paola Subacchi, *Ruota della Fortuna*, (Milano: Franco Angeli, 1996), 42.

⁸ A7-F1-4.

⁹ Artocchini, *Appunti per una storia*, 17-18.

¹⁰ Carlo Poni, "Per la storia dei mulini da seta: il filatoio grande di Piacenza dal 1763-1768", in *Wirtschaftsdrifte und Wirtschaftsege*, (Stuttgart: Klett-Cotta, 1978) 83-114.

new *filatoio*¹¹. These documents reference a new sub-canal for a new production facility created by the Farnese duke. In the letter the writer, Count Corrado Marazzani, complained that a house he owned alongside the water course for the new ducal *filatoio*, had been damaged by the water from the small canal. The engineer visited at the command of the committee and in his report located the house in the street alongside the Palazzo di San Lorenzo, perhaps a reference to Palazzo Madama. He noted that the basement had been flooded by the canal and the street damaged as well, however he could not endorse the Count's proposed remedies. These documents support the location on the map of the ducal *filatoio* along Rivo San Agostino north of the monastery San Lorenzo in the 4th quarter.

In 1691 the engineer Giuseppe Cremonese submitted a bill to the committee. It detailed the costs and materials for Rivo San Agostino and he noted the canal went to the *filatoio* of the duke¹². This would confirm the location of the ducal production facility along Rivo San Agostino near San Lorenzo. The location is confirmed again in a *memoriale* from Mattia and Carlo, the Romeri brothers, who wrote in 1723 about the purge of Rivo San Agostino, which they noted conducted water to the large *filatoio*¹³. The most intriguing aspect of this large industrial facility is precisely its location. With multiple mill operations to provide for silk spinning it had to have a sufficient quantity of water to move the wheels. The volume of water, with sufficient flow speed, available at this distant, downstream end of the system implies that there was actually quite a lot of water in the canals even this far from the Trebbia source.

Another *Filatoio Grande* may be the subject of a tax document for 1733¹⁴. There a *gatto* in Rivo Beverora was described to be located in the ditch outside the city walls, where it continued through Porta San Raimondo and was connected to a *filatoio grande*. If this is an installation on the Beverora or one of its offshoots then it is a different one from the ducal-owned industry referenced in earlier documents. The final reference to an industrial facility in the documents is in a criminal case dated 26 July 1734, which

¹¹ CSO 15-F1-26 and 15-F1-27.

¹² CSO 17-F1691-13.

¹³ CSO 19-P1723-1.

¹⁴ CSO 6-P1701-30.

involved the monastery of San Siro¹⁵. The introductory paragraph describes the Rivo San Siro. As it entered the city walls at the monastery of San Agostino, it divided at the garden and continued to the interior garden of the convent of San Siro where it also serviced their mill. The case involved a *filatoio nuovo* located in such a way that the canal for this production facility had caused damage to San Siro. This would place this *filatoio nuovo* somewhere near the city walls by San Agostino and San Siro in the 2nd quarter rather than in the 4th quarter.

The potential for conflict between the varied water users becomes clear when the actual mill locations are plotted against Romani's demographics of wealth distribution in the city. Unlike today's highly zoned cities, in Piacenza at that time the wealthy lived in close proximity to the industrial facilities powered by the water channels.

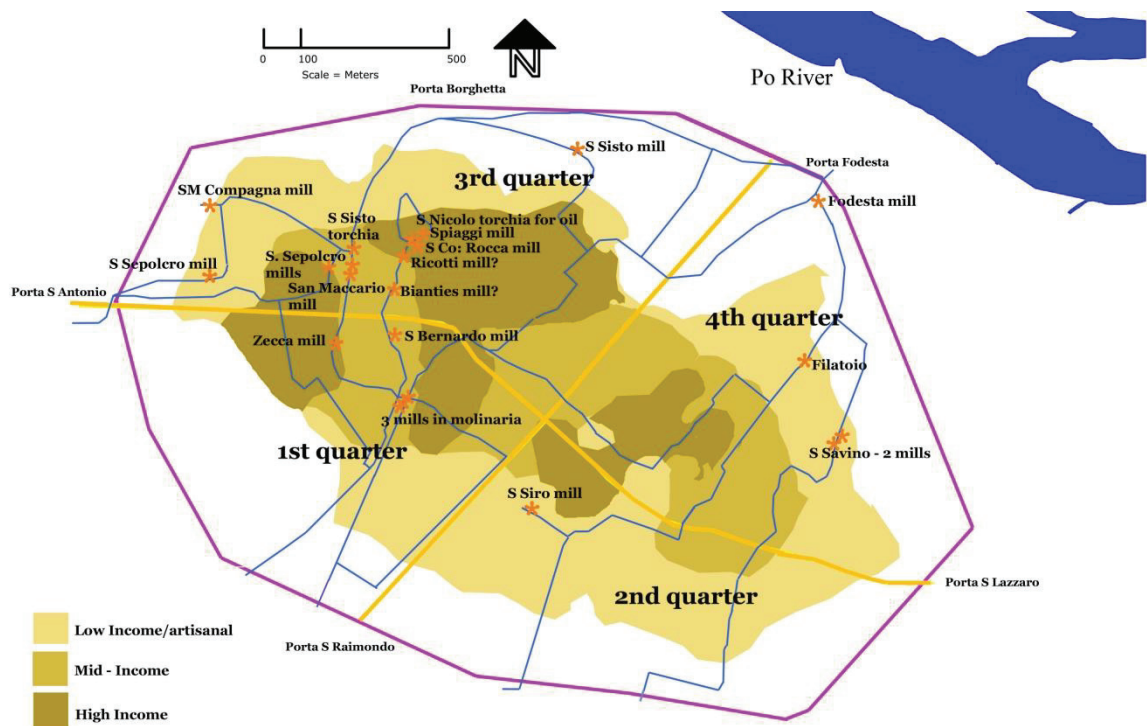


Figure 5-13: Wealth demographics with mill locations in city.

¹⁵ AT3-F1-20.

In some cases the mills were located quite close to the noble palaces and convent gardens. This could have created instances of conflict if a miller or a gardener failed to manage a canal lock properly.

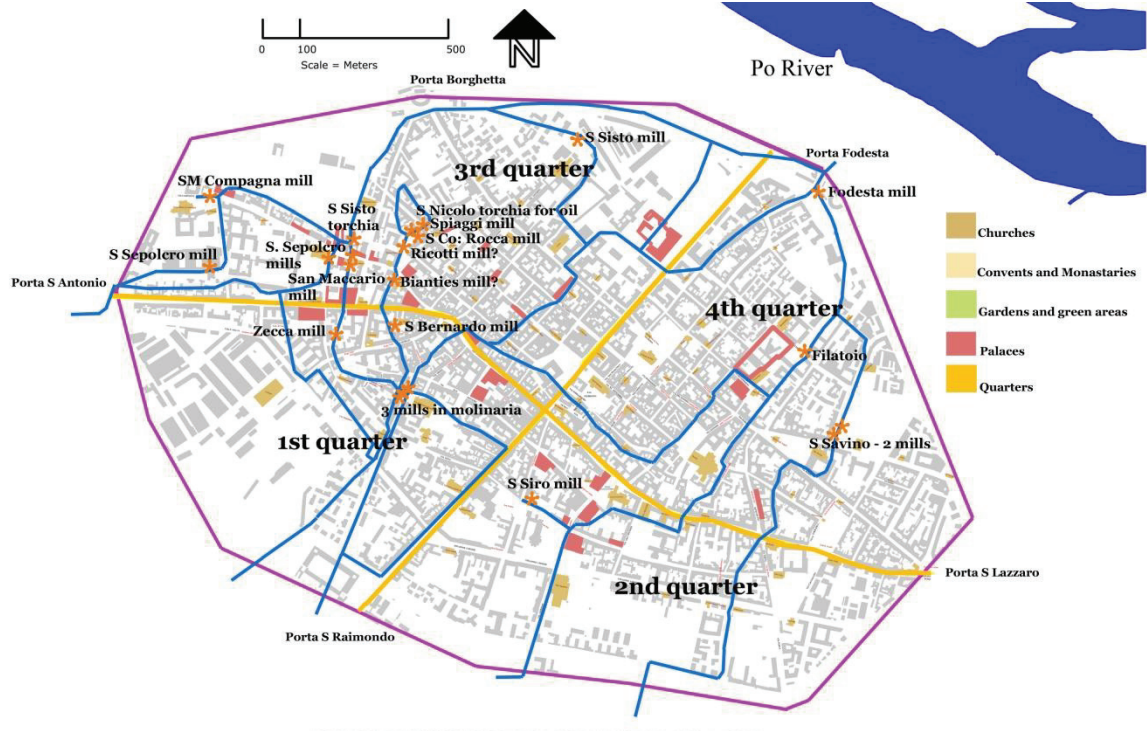


Figure 5-14: Canals, mills and noble palaces.

Garden locations

The urban garden was an important site for many residents according to Squatriti. He argues that in the early Medieval period in Italy urban areas had clusters of vegetable gardens either just outside the walls or even inside the centre. This is because such gardens demanded frequent investments of time and labour and were often attached to a home and considered an important part of it. It is clear from the maps of Piacenza that some were disconnected from the residences of those who owned them. Squatriti believes that much of the irrigation system created or renewed in early Medieval Italy had more to do with service to the kitchen gardens than with the culture of crops like wheat. Wheat was planted with the scatter method which does not lend itself well to irrigation. It is the vegetables like onions, cabbages, lettuce and legumes that needed frequent watering and

which were grown in the urban gardens and planted in rows. Squatriti also notes that an urban garden was a prized possession not only for its produce but because it was a place where the gardener received an increased productivity payback for increased labour. Thus while irrigated farming can be much more labour-intensive than dry farming it was worth the effort, and it was worth the cost of site improvement with fences, channels, ditches and a reliable water source. Squatriti points out that from ancient times horticulture was connected with irrigation in Italy. The monastic houses that invested in the urban water channels revived the tradition of intensive vegetable gardens, often on urban sites, and often as a place to experiment with new plants and new varieties¹⁶.

Irrigation systems did not come cheap. Gardeners either needed a channel with a supply brought in from outside the site or a well. Squatriti points out that the construction of wells was expensive and complicated so that costs might be split between users. Wells and access to their water might be divided up by timesharing, not unlike the larger *quindicena* system in the countryside¹⁷. The advantage of a well was that a gardener was not dependent on the water channel and its management and costs. But any shared system meant that people had to agree on the rules whether it was a shared well or shared canal. The labour involved in the creation and maintenance of these systems demanded cooperation¹⁸.

The number of actions that involve *orti* (food production plots), *giardini* (more ornamental gardens) and *prati* (meadows) within CSO documents ranges from a low of 19% to a high of 100% of land-use actions in a decade. This averages out to about 50% of actions per decade. Does this reflect the actual percentage of land used for agriculture within the city? It is not easy to map the *orti* and *giardini* within the city. Certainly, on historical maps, there are large green areas where food could have been produced inside the city walls. As well, many of the large convents and monasteries had their own food production areas within their properties and often on lands outside of their enclosures.

¹⁶ Squatriti, *Water and society*, 80-81.

¹⁷ The *quindicena* system distributed water for irrigation canals on a time share basis. Users were divided into those who could use the water on weekdays, and those who only had access from Friday evening to Sunday evening. Sometimes this was a two week interval. This system nested within the larger seasonal divisions of water.

¹⁸ Squatriti, *Water and society*, 83, 89.

Nobles too had gardens connected to their palaces and on other land within the city. Food production within the walls appears to have been an important enterprise. A rough calculation shows that the Farnese walls enclosed about 300 hectares of land for the entire city. A measure of the large gardens that edged the city within the walls amounts to a total of about 60 hectares or 20% of the urban space. Inclusion of all of the smaller convent and other gardens would certainly raise the amount of land devoted to agriculture within the city walls. Much of this acreage lies just inside the city walls and like the agricultural sites outside the walls, provided a cleared space along the walls needed for defense. Similar to cities today, some of this land could have been seen as areas that were undesirable to develop for one reason or another, or simply was land that was waiting for development due to population stagnation after 1590. A glance at a contemporary map of the city shows that many of these areas remain under or undeveloped to this day. Today such sites are not necessarily used for food production but often host low-density industrial activities or are owned by the army and remain underdeveloped.

In Piacenza, while the gardens, like mills, were dependent upon the water from the canals, it is expected that they would be more widely distributed throughout the city. Convents, monasteries and noble residences were dispersed throughout the city with some concentration, especially for religious institutions, on the western edge. An examination of the location of gardeners does indeed show a more even distribution within the city than millers. Some of these people may well have worked just outside the city walls in the many cultivated fields that also served the needs of inhabitants. Both inside and outside the city walls the open areas left for defensive purposes were used for growing food.

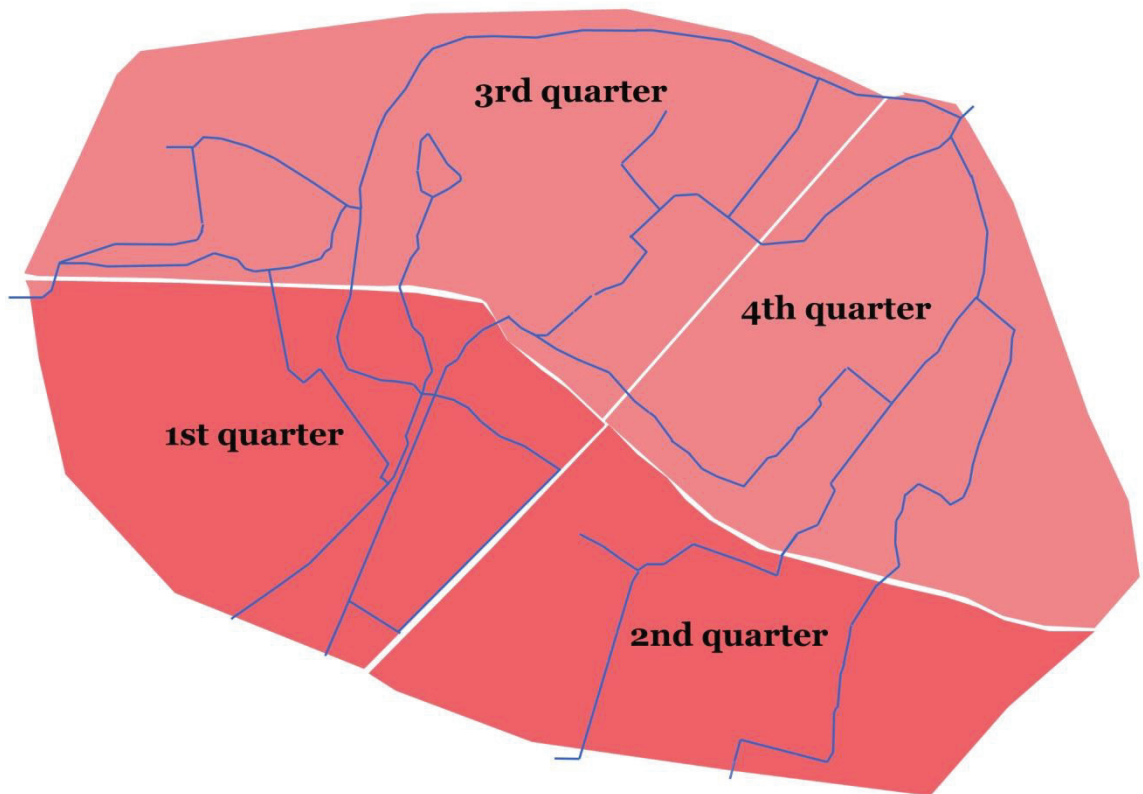


Figure 5-15: Percentage distribution of gardeners within the city. Quarter #1: 33%, quarter #2: 29%, quarter #3: 17%, quarter #4: 21%.

An assessment of maps from the 17th and 18th centuries shows a green city, one with many sites for kitchen gardens and small food-producing parcels of land inside the city walls. Many of these belonged to the church institutions, but some are labelled on the maps as owned by nobles who resided within the city. While mills had to be located on a water course, green areas were not quite so limited. They needed access to water but did not need to be located on one of the larger water channels to access the energy from its flow. Yet, the water canals should have influenced the location of these sites and set up patterns of use.

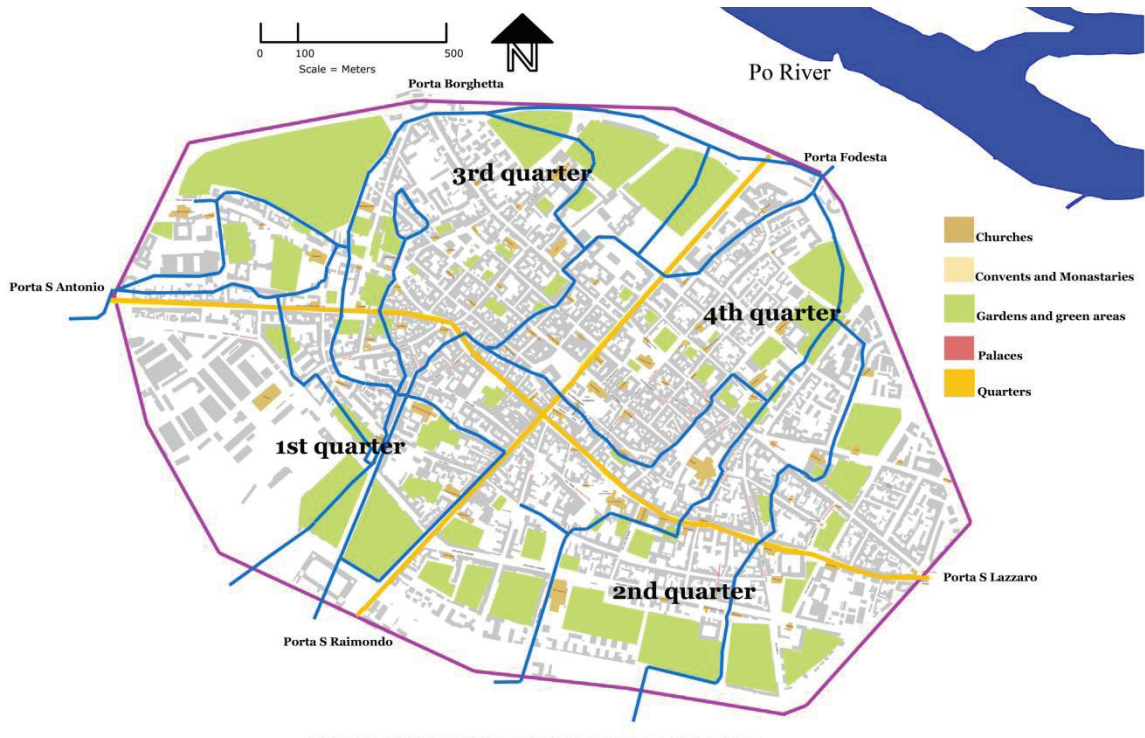


Figure 5-16: Composite of information from several historical maps and Fiori's book of food producing gardens within the city walls during the Farnese reign.

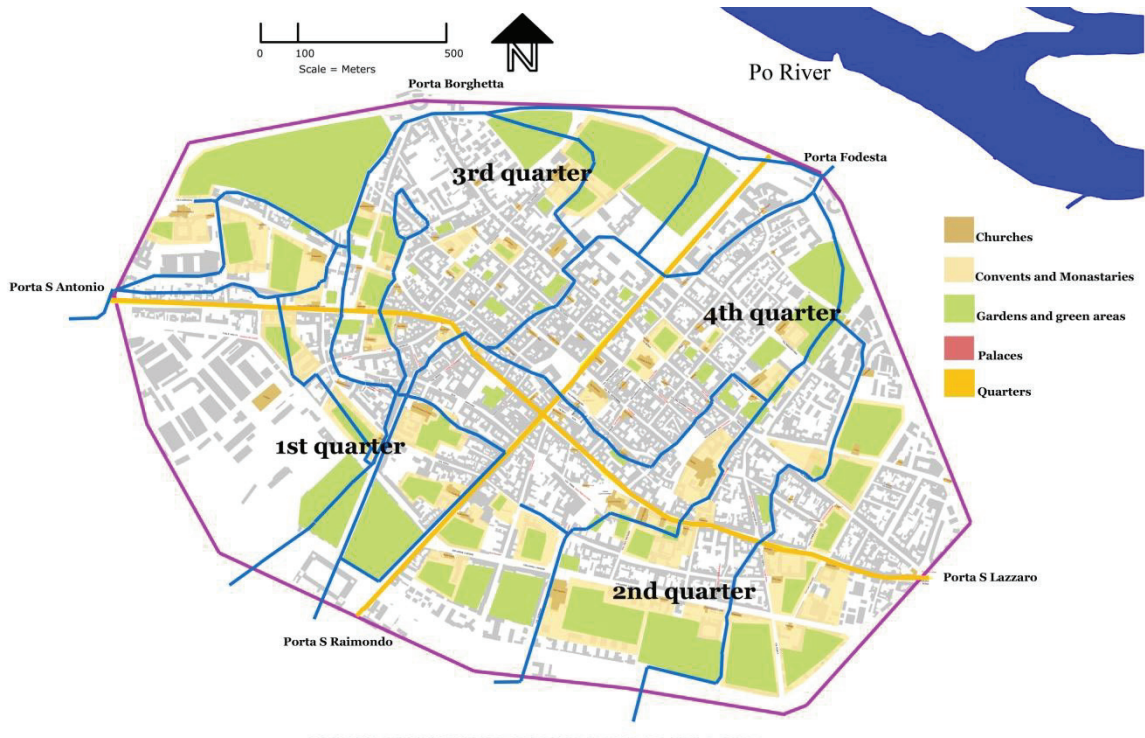


Figure 5-17: Ecclesiastical properties with canals and urban food gardens. While many convents and monasteries had gardens on their primary site, they also owned further food production sites within and outside the city walls.

When the city extended the walls, it took in areas that were already under cultivation. This pattern of land-use remained within the city walls. The centre of the city was most developed and therefore had the least green space; while the city edges, along the canals and smaller channels, remained productive agriculturally for institutions and individuals. Some of the green space, along the edge of the city, provided for industrial uses and included ponds that could have been used to rinse and wash fibres and textiles. Informal oral accounts by current residents indicate that some of the ponds were also used for domestic laundry. According to this informal information clay was excavated for brick production in those areas as well. That some of these areas were quite low-lying is indicated by maps that designate fields, such as those in the upper left hand side of this diagram as irrigated land for cultivation. Green areas along the line of the Fodesta Canal

may well have been used as a means of flood management. This area of the city flooded when the Po River was high into the 20th century.

It is beyond the scope of this research to compile a complete and detailed map of the 17th century city. All resources available have been utilized but still there are gaps in the materials. This raises questions about the layout and land-use of the city. For example, it appears that there were fewer garden areas along the roads to Porta San Lazzaro and Porta San Antonio. Porta San Lazzaro was the gate where travellers from Bologna and points south entered the city, hence it was the main route to and from Rome. Porta San Antonio led to the road to the Trebbia River and the early port for the city. Both may have had settlements along the roads prior to the Farnese extension of the walls. Prior settlements may have limited the amount of undeveloped land available for food production although, the establishment of a defensive clearing of land inside and outside of city walls would have meant that some of that land would have been emptied of existing buildings and left open.



Figure 5-18: Map of city with urban gardens of all types. Piano della Città di Piacenza / Pietro Ghisalberti Perito Geometra Patentato li 3 maggio 1827. BPL-M cass7 n10

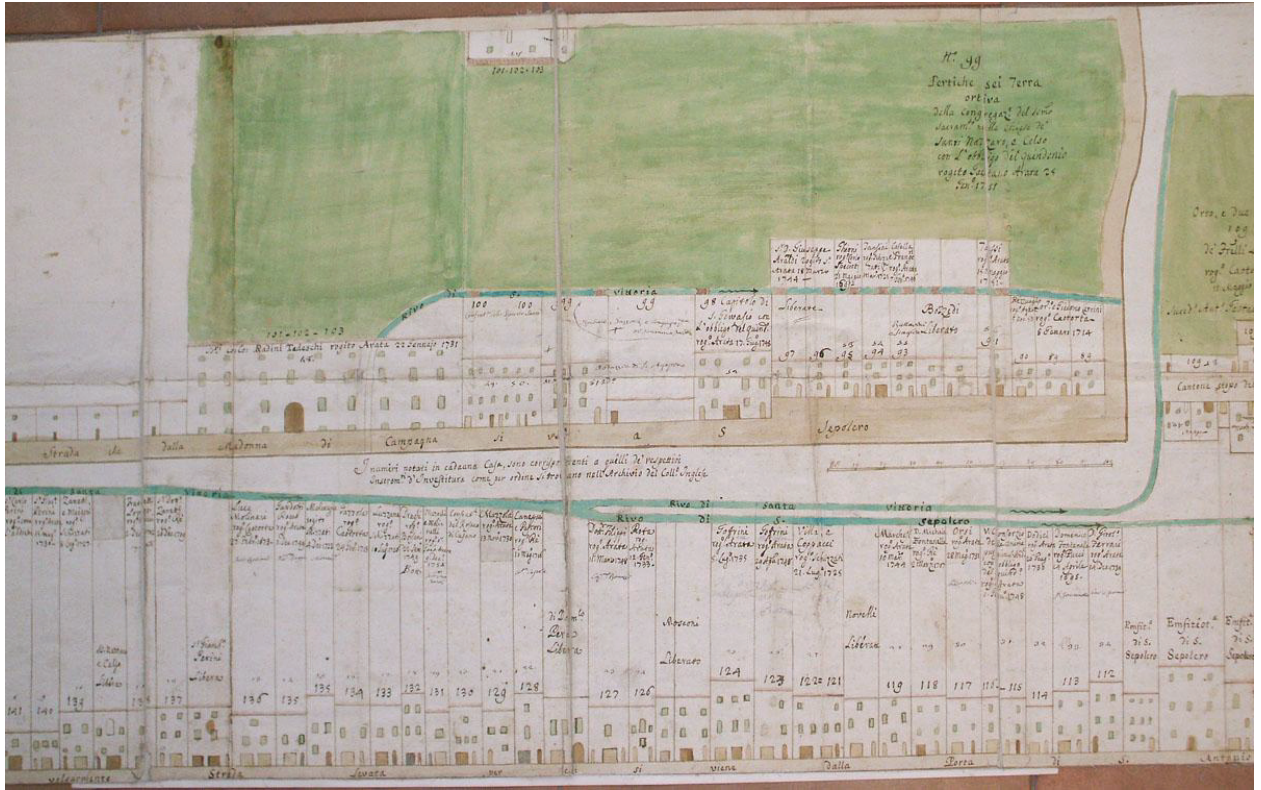


Figure 5-19: Close up of map that shows irrigated fields along Via Campagna, BPL-M cass8, n7., 2nd half of 17th century.

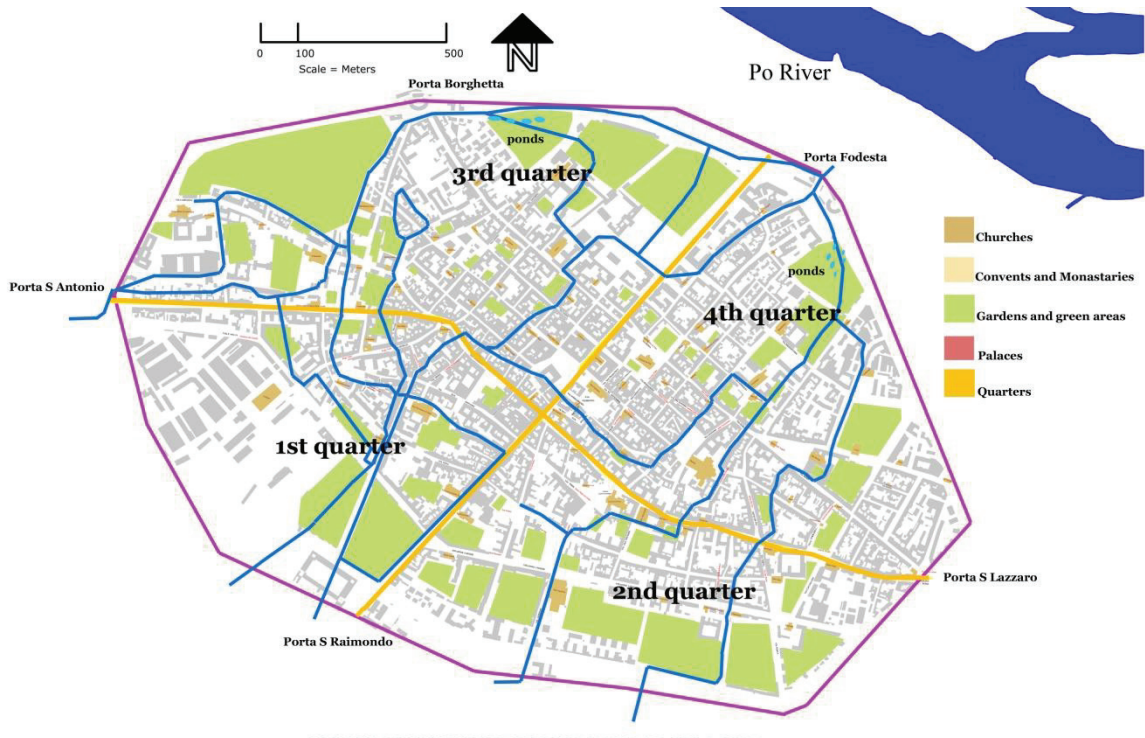


Figure 5-20: Pond locations in the city. These were sometimes shown on city maps however, individual ponds are not definite. This map simply shows the areas of the city where they were located.

The relationship between the spatial distribution of wealth and ownership of green space is unclear, as both institutions and individuals owned, rented out, and gained from production on fields that were located apart from their residences.



Figure 5-21: Distribution of income overlaid with green space and canals.

As the city developed, gardens and mills became mixed-in together. Mills and gardens were upstream and downstream from one another. This made the management competence of millers and gardeners vital to the smooth functioning of the whole system as a means to avoid conflicts over water usage.

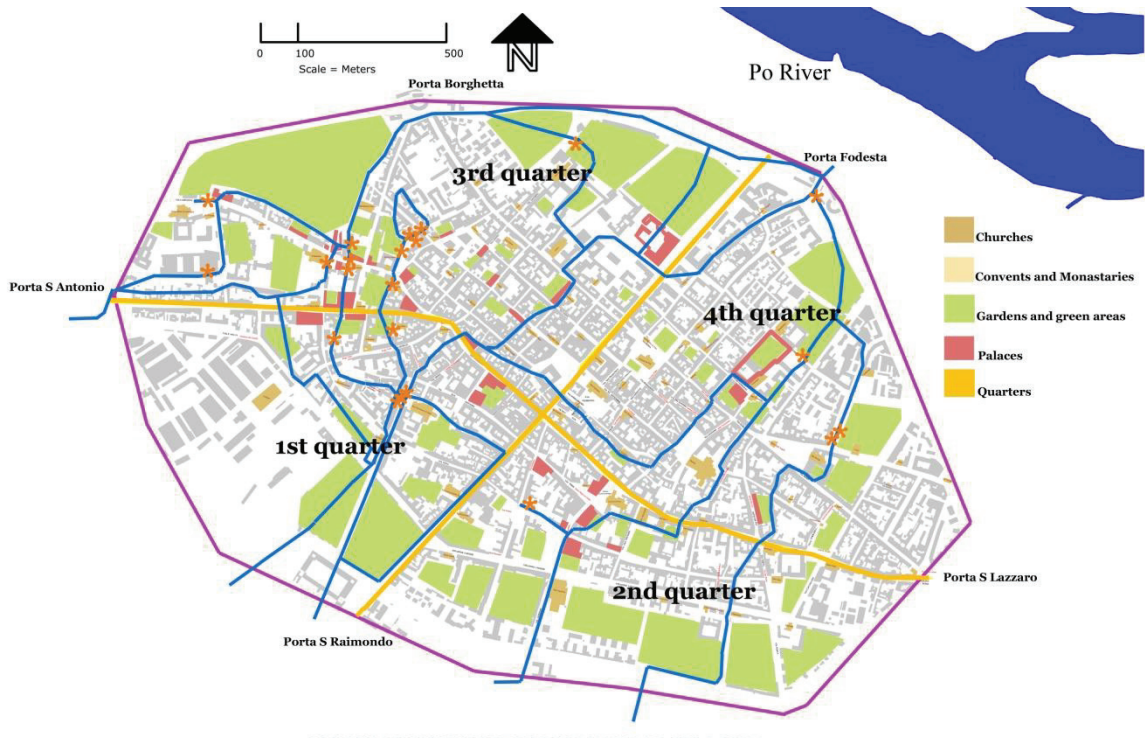


Figure 5-22: Canals with mills, palaces, and gardens.

Textile dyers and *sborzori*¹⁹

Water was also used in the industrial production of dyed textiles, which were produced in the city. Dyeing required a large amount of water in order to provide even coverage of the fabric in the vats. It would be expected that such work would be located in industrial zones with easy water access. Wool also required fulling and felting for many uses. This is a process where the wool fibres were condensed to provide a stronger and thicker fabric, first by cleansing the oils and lanolin from it, then through beating the wool while it was submerged in water. In Piacenza there were 5 fullers, and all of them were located in quarter #1. The people who dyed the fabrics, a total of 24 in the city, also resided mainly in the first quarter. This may have to do with the location of Rivo Beverora and the start of its key derivations upstream of other uses.

¹⁹ The word *sborzori* has been impossible to translate. Experts in Piacenza have been consulted without any clear results. It is likely that the profession, which also named a street, was connected to dyeing or some aspect of textile production.

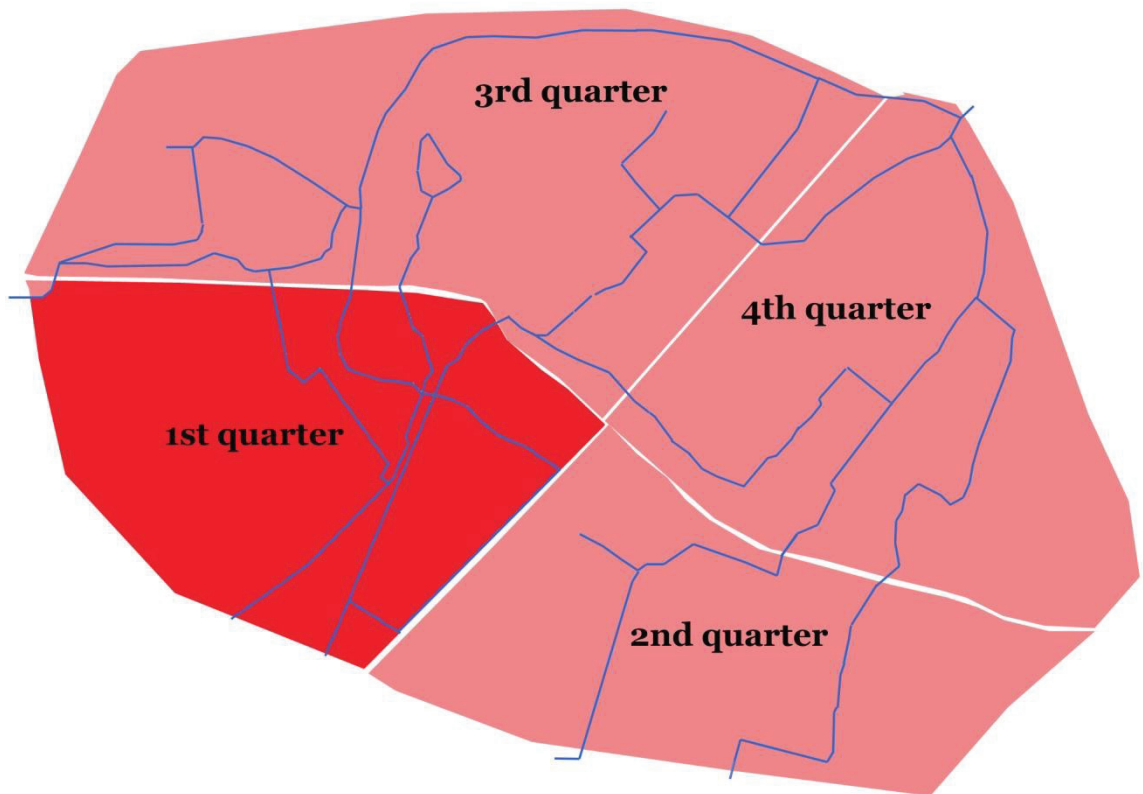


Figure 5-23: Percentage distribution of dyers within the city. Quarter#1: 71%, quarter #2: 13%, quarter #3: 8%, quarter #4: 8%.

From the investigation into Romani's work, it is clear that the established land-use patterns were often set by the location of available water through the channels. Over time these patterns also influenced the locations for various industries, artisanal activities, the convents and monasteries, and ultimately the Farnese-era palaces of the nobility. Water, as the essential resource determined the land-use patterns visible in the maps. The various wall extensions seem to be an acknowledgement of established land-use approaches and attempts to bring wealth under immediate control of the urban administration and to defend it.

Valeria Poli contends that it was the original Roman radial road system that determined how the city expanded. She does acknowledge the influence of the canal

system, especially within the walls²⁰. Out in the countryside there is a long stretch where the main city water canal, Rivo Comune, runs along the road leading to the city, but once inside the city the canals, other than the Beverora, appear not to acknowledge the road system much at all. They meander around, weave in and out, dive under roads and resurface in gardens. Perhaps beyond the obvious factor of topography, the location of the canals was determined by the financiers, who had invested in a particular waterway and expected service to come to their door, or at least nearly so.

While the city pushed outwards along the old Roman road system, establishing successive gates with each new expansion, the land-use patterns were clearly dependent upon the location of water for mills, artisanal processes, and the food production areas. The CSO inherited the infrastructure laid down in earlier years. The CSO also inherited the social structure of a water system that worked as a private/public partnership with multiple *consorti*, who were engaged intimately with the provision of water to the urban population. As a committee then, the main task was to preserve a sociopolitical process that facilitated maintenance and repair. To accomplish these goals the committee communicated with inhabitants, monitored expenditures, and collected the monies to finance the utility, and prosecuted those who abused it in some way.

²⁰ Poli, “Il sistema delle acque,” 333.

5.2 PARTIES INVOLVED IN THE WATER SYSTEM

The canal system in Piacenza was more than water channels, locks, sluice gates, bridges and other types of infrastructure. It was a community enterprise for people who had to work together to manage it. Because it was a gravity-fed system people were involved closely with it on a day-to-day basis. However, there were different roles within the system due to class or employment. This section examines the people involved and their varied levels of participation and power within the system. The effects on the urban space of the choices and decisions made by the participants who interacted with the *Congregazione sopra l'ornato* will also be investigated.

5.2.1 The members of the CSO

The members of the CSO were primarily a small number of nobles who also sat on the larger city council. They were elected to the council under the rubric of the four main ancient noble families in the city and then onto the urban management committee also as representatives of the historical urban factions. These feudal dynasties consisted of multiple branches and families with varied wealth, power and influence. The Farnese dukes inherited this system of selection, though they attempted reforms, especially to limit the power of the four main feudal families. The Landi (*Ghibelline*) and Scotti (*Guelfi*) represented the two opposing sides that had dominated Piacenza politics since the 13th century. The two families also represented enormous power over the water system. The Landi had been given control of the site where the Trebbia flowed into the urban canals under the dukes of Milan in the 15th century. Their main family seat was at Rivalta, along the right hand bank of the Trebbia, looking downstream, just as the hills begin on the edge of the valley. The Scotti held lands and canals on the left bank of the Trebbia though they did not have the control over the urban system that the Landi enjoyed. However, Landi fortunes suffered as they opposed the Farnese dukes and participated in plots to overthrow them. It was this political miscalculation, along with the withdrawal of imperial troops from the citadel that allowed Ottavio Farnese to reform the arrangement in 1585 and take control over the urban canal system. Yet, other branches of the Landi maintained a position on the CSO along with the Scotti. Others named in the *convocati* are also titled nobility, the Anguissola (traditionally affiliated with the Landi),

and the Casati. The other names that are often present are less clear in their standing and affiliation except for the Arcelli, also titled nobility, in their role as commissioners.

Poli explains that the Arcelli were appointed Water Commissioners, according to the Farnese reforms, to serve over the whole system. Antonino Arcelli was appointed in 1595 and was followed by Giacomo Filippo Arcelli from 1596 to 1618. The Water Commissioner was appointed for 3-year periods and had to at least be tacitly approved by the city council. The council had protested in 1591, against outsiders such as Achille Guardata, Carlo Pandini and Lattanzio Ventura from Urbino who had previously held the position. Poli notes that the office of Commissioner became the object of a power struggle between the city council and the duke. The job of Referendario, also a part of the reform, then went to the family Rossi, Giovanni Giorgio and his son, Ulderico from 1590 to 1625²¹. In 1660 duke Ranuccio II appointed Gio: Paolo Nicelli to the office of Referendario and in 1669 Pietro Francesco Barattieri became the Commissioner, names that are present in CSO documents though not in the earlier *convocati* that were examined²².

Attendance records of the committee meetings demonstrate that generally at least one member came from each of the four main traditional family coalitions in the city. The committee also included members who designated themselves as former council members and sat on the committee perhaps out of interest or expertise. Always present were the Governor or his representative who were appointees of the duke and oversaw the administration of the entire duchy of Piacenza. The final member present at meetings was the professional in charge of the larger canal system, the Commissioner or Referendario. Many of these individuals appear to have sat on the committee for long periods of time. This would have given some individuals an important expertise in the management of the urban water and sanitation system.

The committee often met on a weekly basis but appears not to have required a quorum for its decisions. At times all six members met with the Governor in attendance, and in other meetings, it might be only one or two members with the Governor. While the

²¹ Poli, *Le acque di Trebbia*, introduction to page 5 and p 50.

²² *Ibid.*, 111.

chairmanship of the committee seems to have rotated amongst the members, the Governor was the defacto head of all of the urban administration. It is his name which went on the orders issued by the committee along with the chair or *priore* of the CSO.

These noble families, who sat on the city council and its committees, were also often the same people with families who had an interest in the irrigation canals out in the countryside. In times of diminished water flow plainly there could be a conflict of interest between use of irrigation water in the countryside and the provision of sufficient water to the thirsty city. It is not clear in the minutes of the committee meetings how such conflicts were negotiated. Normally, only the final resolution is recorded without any of the discussion²³.

5.2.2 The ducal family

The duke, as the head of government, and the ducal family, as water users, had very limited roles within the CSO. Out of the total number of documents examined for the 200-year research period, the duke wrote only seven letters to address issues of water service or street drainage in the city. On 12 June 1562 Ottavio Farnese (reigned 1547-1587), the son of Pier Luigi, contacted the CSO about a purge of Rivo Beverora and about one Sebastiano Guarnandello. The ducal letter discussed the issue of costs, and who was responsible for the expense of cleaning the canal and removing the waste. In 1581 the same duke complained to the CSO about the condition of Stradone Farnese, the street that bore the name of his house. He felt the condition of the street did not enhance his dynasty's prestige. There had been letters from those along Stradone Farnese with complaints about lack of paving and proper drainage. Ottavio's final communication about the urban infrastructure was on 7 March, 1582, when he issued an order that set out the process of assessment and taxation for the city roads and water system²⁴. It is unclear from the records why the duke intervened personally in these few specific instances.

²³ A list of all *convocati* documents referenced in this research can be found in *Appendix A*.

²⁴ In order of mention: CSO 5-F3-13, 3-F1-5, 2-F1-1.

Ottavio's grandson Ranuccio I, wrote the committee in May 1590 to support a plea of poverty by the Sisters of San Bartolomeo for repair work along Stradone Farnese. In July 1590 Ranuccio I, while not yet duke but in charge of local matters, intervened in a lawsuit with a letter that detailed the need to purge a canal and suggested that a certain Sig. Rutilio should do the work. This was followed on 26 August 1590 with a letter about the purge of Rivo San Antonino²⁵.

The final ducal letter within the CSO archives is a response by Ranuccio II to a letter sent from Baratieri, a city engineer, on 9 May 1670, which addressed a situation that involved the mill of San Bernardo, and a break in the street along Via Castello. This time Sergente Maggiore of nearby Rivalta was identified as holding up the repairs. The appeal was for the duke to enforce compliance by the Sergente. The duke's response was to defer the issue back to the committee²⁶.

An indirect form of ducal intervention came later from Duke Francesco Farnese. From the mid 1690's he began to personally sign orders issued by the CSO. This might be due to a weakness in the CSO administration at that point or simply the duke's absolutist desire to be more involved or in control. While the CSO managed everyday affairs of the system the duke could intervene at any time for any reason. The final letter to the duke from this time period came on 31 August 1728 from Marchesa Costanza Landi. In her letter she complained about Giovanni Cavaglieri and ball games outside her home. Earth had been rearranged to accommodate these games such that the new material blocked the exit for her carriage. She also had problems with rainwater management in the same location. She went on to request permission to repair a wall²⁷. Why Landi felt compelled to write the duke on the matter is perhaps explained by her references in the letter to the Governor, the Criminal Auditor and Count Gazzola. Further ducal involvement with the

²⁵ In order of mention: CSO 2-F1-31, 3-F3-25, 3-F3-26A.

²⁶ CSO 13-F2-36 and 13-F2-36A, the letter does not describe the problem except as a large break in the street. 16-SP1681-2 dated 28 July 1687 is a set of regulations signed by Ranuccio Farnese that addressed financial issues but never mentions a waterway. A7-F2-13A is a *memoriale* addressed to the duke that concerns Rivo Parente and water for the castello from sometime between 1675 and 1680.

²⁷ CSO: 19-P1728-2.

CSO is limited to references of sites the ducal family owned that were affected by water system problems.

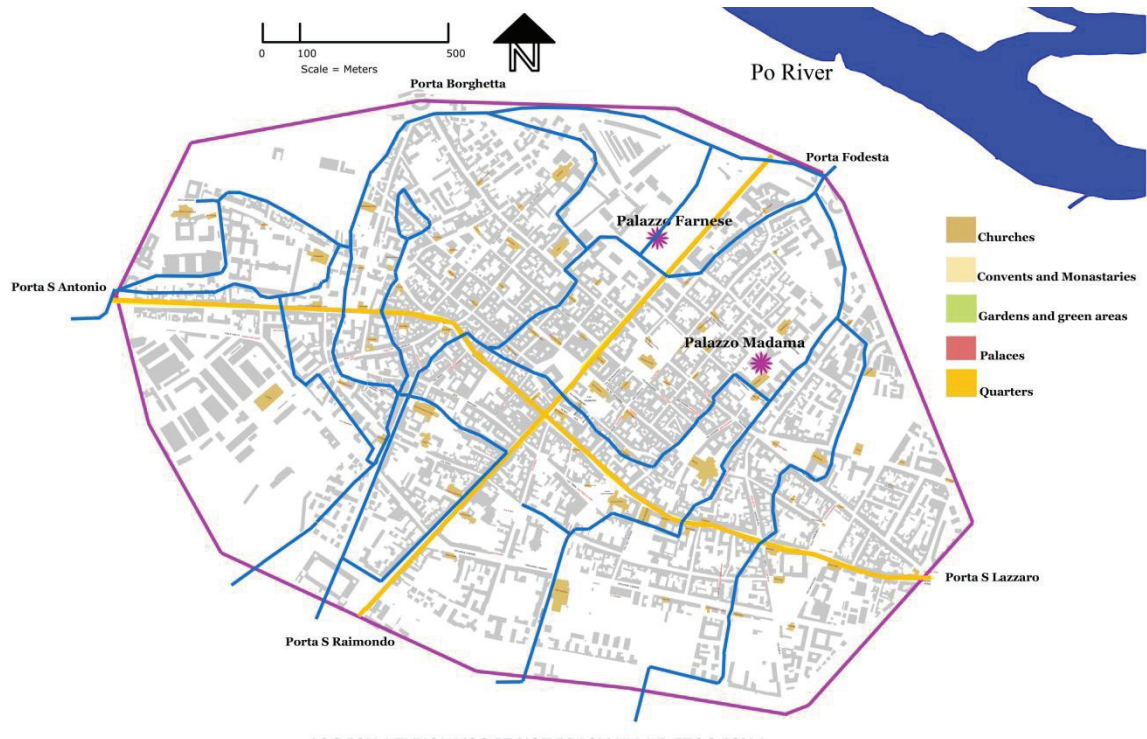


Figure 5-24: Map of canals, Farnese walls, Palazzo Farnese and Palazzo Madama.

Unlike the feudal noble families that built their palaces mainly on the south and west edges of the city, the Farnese located themselves to the north and east along the road to Milan. The Farnese spent most of their time in Parma, however the two major residential properties owned by the ducal family in Piacenza were the Cittadella, known as Palazzo Farnese (beginning in 1558) and Palazzo Madama (used first as government offices from 1603-4). The Cittadella was the older Visconti fortress that was located along the wall on the north and Po River side of the city. The Farnese renovated and transitioned the fortress into a residential palace after the family returned to Piacenza in 1558. The architect credited with most of the new construction was the famous Jacopo Barozzi called ‘il Vignola’ who worked on the building in 1558, after Paciotto. The site included a large kitchen garden that sloped down from the palace towards the Po River and was watered by a channel derived from Rivo San Sisto. Because of the location, the Farnese

palace was at the extreme lower end of this channel. While the channel may have watered the garden it is more likely that potable water was obtained from a well. A tour of the lower part of the building available today does contain what appears to have been a well though that was not confirmed by the museum officials. Ultimately the building was never completed. The Farnese dukes ceased work on it in the early 17th century when less than half of the original design was achieved. Instead they focused their attentions on the principal seat for the court in Parma.



Figure 5-25: Entrance to main courtyard in Palazzo Farnese. December 2010.



Figure 5-26: View of 16th century part of Palazzo Farnese, now a museum and the location of the archives for Piacenza. December 2010.



Figure 5-27: View from window on top floor of Palazzo Farnese towards the Po River. The ducal *orto* today is a playing field for school children. September 2010.

The other property is more difficult to envision today as part of it was donated in the 17th century to the Benedictine convent, and much of the site of Palazzo Madama was transformed in the 19th century into a prison. Palazzo Madama was near the Cittadella, in the northeast part of the city next to the monastery of San Lorenzo and across a small piazza from a palace built by the Landi family. According to Fiori the new Landi palace was completed in 1578 and seized in 1581, after an alleged assassination attempt on Duke Ottavio. At that time, it was designated by the duke to house the magistrates and continues to do so to this day. This area of Piacenza also hosted the church of San Eustachio that dates from at least 1253, and the church and monastery of San Lorenzo from 1333. Fiori notes that the Palazzo Madama, constructed in 1657 to 1658, took over the large monastery garden²⁸. However, other records make clear that the site was in use by the Farnese long before it became the palace of the widowed duchess.

²⁸ Fiori, Il centro Storico di Piacenza , tomo 6.



Figure 5-28: The facade of San Lorenzo today. October 2010.



Figure 5-29: The former Landi palace, now the offices of the magistrate. October 2010.



Figure 5-30: Part of the justice and prison complex that replaced Palazzo Madama. October 2010.

These properties were in what was the edge of the city, as development left off and land-use shifted to fields and gardens inside the wall. It is conceivable that the original garden of the monastery of San Lorenzo was quite large. Fiori comments that the Benedictine convent on the corner of Via Benedettine and Via Giordano Bruno X, founded in 1677 and completed in 1681 by the Farnese duke, was located in the area of the garden of Palazzo Madama. Ranuccio II built the Benedictine church and convent to fulfill a vow following the illness of his wife²⁹.

Ada Segre, who has studied the gardens at San Lorenzo, observes that the Palazzo is often understood to have been built as a residence for Ranuccio II's mother, Margherita de' Medici (1612-79), wife of Odoardo Farnese (1613-46). It was the custom at the time to build palaces for noble widows. Segre challenges that notion with evidence that the palace was built much earlier as an annex of Palazzo Farnese, the Cittadella, to provide rooms for the members of the ducal camera, the governing representatives of the duke in Piacenza. It is unclear whether its primary use was as an office building or residence at that time. Segre describes the palace as having been divided into apartments for a number of different officials, including at least one who had a private garden. Construction on the palace was actually begun in 1603-04 and continued to completion in 1612 long before

²⁹ *Ibid.*, tomo 6.

the widow of Duke Odoardo Farnese, born that same year, would have moved in. The archival accounts that Segre accessed describe gardens on the site at that time. She cites an account for 1608-09 when a brick water conduit, which ran through an official's garden, required repairs. Segre contends that the palace changed its role in 1656 when it was given over to the dowager duchess Margherita for private use as a residence. The renovations at that time may have included new gardens.

Of course, it is likely that the site was a garden before construction of what became Palazzo Madama. Gardens, especially kitchen gardens, were commonly found on the edge of the city as it expanded. Segre notes a mention in a notary deed, when the lands were acquired, that referred to a new palace on the site of a garden at San Lorenzo. The Farnese income book of 1593 also mentions a garden near San Lorenzo included in the property confiscated from the Landi family³⁰. Segre was primarily interested in the interpretation of a garden notebook that describes in detail the ornamental gardens at the palace. However documents within the CSO and *Acque di Trebbia* mention other uses for the water channels that ran through or near the site.

The gardens of San Lorenzo, Palazzo Madama, and the new *filatoio*, or industrial facility, on the site are included in the CSO archive due to their location at the bottom of the Rivo Meridiano. This is the same canal that serviced the meat market near San Donino southeast of Piazza Grande. The canal then flowed down the hill of Sopramuro, across piazza Duomo, crossed Via Roma and then entered San Lorenzo and the government complex. At least part of the time the water channel into the garden would have flushed the organic wastes from the meat market. The first mention of the site in the CSO is in 1602, in a letter in which the writer requested a license to construct a drainage pipe under the road. He described his location as near San Zeno and across from the garden of the Serenissima Ducale Camera³¹. This supports Segre's contention that the site was used as an extension of the Cittadella before it became a widowed duchess's residence.

³⁰ Ada V. Segre, The Gardens at San Lorenzo in Piacenza, 1656-1665, (Washington DC: Dumbarton Oaks Research Library and Collection, 2006), 5-13.

³¹ CSO 4-F4-6.

Later documents tend to use the Palazzo Madama as a reference point in their descriptions of the location of Rivo Meridiano. On 27 August 1652, a *supplica* explained the need to purge Rivo Meridiano and referenced the garden of *Sua Altezza Serenissima Duchessa* because the waterway irrigated the site³². Another letter from the same year complained that, despite two purges recently completed, the Rivo Meridiano was full and the flow had been insufficient for the past six years. It was noted that this must affect the garden of the duchess. This last reference was used as a means to incite quick action on the part of the committee³³. A letter dated for 1667 discussed the purge of Rivo Beverora and also mentioned Rivo San Sisto or San Siro and San Lorenzo. It was noted that the garden of the ducal camera was affected. But whether this was the Cittadella or the Palazzo Madama is unclear as at least one of the water channels under discussion is related to the Cittadella³⁴. A 1668 order issued by the committee had the intent to repair the infrastructure in Rivo Meridiano. It mentions the “*giardino di SAS*”³⁵.

From that point forward, the gardens of Palazzo Madama and San Lorenzo are noted only in the reports from engineers to the committee. Generally the reports used the garden site merely as a point in a longer description of the path of the water channel. In a 20 July 1671 report, Baratieri described the path of the old Rivo San Siro (also known as San Agostino) and noted that it entered the property of San Lorenzo and the garden of the duchess where it met the Rivo Meridiano. The rivo then ran under the duchess’s “*moline e machine*” which would indicate a mill and possibly the *filatoio* (silk spinning factory). A report dated a month earlier by the engineer Alessio Cremonese also noted that Rivo Meridiano ran through the garden of the duchess³⁶. On 18 August 1690 engineer Guiseppe Cremonese described the route for Rivo San Agostino as it went along to San Lorenzo and then ‘*far lavorare il nuovo filatoi di SAS*’, that is, that the rivo provided water needed to power the new silk spinning mill owned by the ducal family. He commented that it was possible to do the necessary repairs for little cost. He then

³² AT: A8-F1-8B.

³³ AT: A8-F1-8C.

³⁴ CSO: 13-F2-24.

³⁵ CSO: 13-F2-27, SAS refers to *Sua Altezza Serenissima*, or His Serene Highness, the duke.

³⁶ In order of mention: AT: A3-F1-13D, AT: A3-F1-13E.

submitted a bill to the committee in 1691 for costs of repairs to the canal of San Agostino that went to the ducal spinning mill for 204 *lire* and 4 *soldi*³⁷. The garden, mill and industrial facility were on the single site, all of which required sufficient water service. It should be noted that it is easy, to confuse the water channels in the descriptions, for they serviced the various locations within the complex. And even at the late date of 1670 the names San Siro and San Agostino were still used interchangeably for the same waterway as it ran through the city.

The duke and his family appear to have had two roles. Until the 1680's, the duke was appealed to, on occasion, in order to influence outcomes within the system's management. This role seems to have diminished with Ranuccio II. Otherwise, the duke and his relatives were users of the system in the same manner as everyone else. And like everyone else, they suffered if regular maintenance was inadequate or delayed. Clearly the ducal family gardens were sufficiently well-known to act as a reference point in the description of the course of the canals connected to the site. But of more interest is the initial decision that located the ducal official residences and the new convent on the extreme downstream ends of the canals. While a residence along the north wall allowed for the arrival of reinforcements in times of upheaval for the earlier residents, the dukes of Milan, all the pollution flowed to those points. The ducal family experienced the urban water system at its dirtiest during dry summers. This is especially true since, except for canal maintenance, the CSO records contain no indication that people sought to clean the pollution of their waterways through any means other than occasional removal of silt and sediments. It may simply be that the Farnese chose to establish themselves in that part of the city and make it theirs. However, it is not clear if this spurred the committee on when it came to canal maintenance.

5.2.3 The *Consorti*

In a time when most work was labour rather than capital-intensive, the associations or *consorti*, were the heart of the Piacenza water system. It was only through the contributions of many people both in the countryside and in the city that the canals were kept clean and the water flowed all the way to the Cittadella and Palazzo Madama. The

³⁷ The report is CSO 17-F1690-9 with the bill CSO 17-F1691-13.

consorti were the small associations of interested parties who oversaw the function of the entire system, piece by piece.

Pierre Racine and Maria Cademartiri mention these associations in their accounts of the Medieval water system in both the countryside and the city. In the preface to the *Registrum Magistrum*, Racine describes the organizations of people who owned the various parts of the infrastructure as a means of wealth generation. These *consorti* carried the costs of mill construction and management, and the canals that fed them. The profits from the sale of water would then be divided among members of the society. In the countryside it was private capital supplied by the churches, feudal nobles, and *consorti* that built the irrigation canals.

The societies acted as a means of risk management and pooling of investment in the system. By offering a profit from the ownership of a water concession the city outsourced the risk of canal management to these private associations. The private interests accepted the costs of system maintenance in exchange for the potential of earnings and profit. Of course, if the infrastructure needed major repairs or there was a low water flow that failed to provide the customers adequate service, then the *consorti* paid the price.

The *consorti* may well have been a formalization of existing relationships that allowed for shared use of water resources. Squatriti describes how people would share wells and that such shared resources promoted cooperation and sociability between neighbours and associates. Further, while the Medieval period was a time of overall privatization of water rights, the formation of associations like the *consorti* would have had the effect of levelling out relationships. People of diverse classes and occupations would have had to cooperate and share the management of a watercourse. This social collective then had to come up with a fair way of maintaining the waterway and to effect repairs. People who might never have interacted with one another otherwise became shareholders in water and its infrastructure³⁸.

Racine notes that the city used concessions and the sale of water rights to all possible economic advantage. Water rights gave the concession owners license to construct

³⁸ Squatriti, Water and Society, 31.

waterways and mills from the Trebbia and the Nure³⁹. On 5 April 1199, in Piacenza, the Podestà gave two men in association together the rights to extract water from the Nure for a mill in Turano and Valconasso⁴⁰. On 17 February 1200, the Podestà, Guido di Mandello, dealt with several parties who formed a society to extract water from the Nure and conduct it to Monteguccio in order to feed two mills⁴¹. And on 26 February 1200, Mandello again issued a concession to several people who had formed a society to take water from the Nure and divert it to Pontenure for two mills⁴². The tradition of legal associations created to manage local infrastructure has a history as long as that of the urban government in Piacenza.

Cademartiri discusses the early years of the city-owned system, and describes the *consorti* as groups of those people whose property bordered on the water channel and over whose land it ran. The obligations of an association member were based upon the proportion of the channel that was owned or utilized⁴³. Persons designated as part of an association had the responsibility to care for and maintain the rural canals. The ecclesiastical institutions could be part of an alliance or work alongside those who had responsibilities for the same part of the water system⁴⁴. By the time of the CSO, the function of the *consorti* was firmly established through long tradition. The CSO inherited the system from the previous government and simply continued the management structures.

Consorti are mentioned in every type of CSO document over the course of the two-hundred year research period. In a *supplica* from 12 May 1590, the writer declares that the College degli Inglesi, San Savino, the Monastery della Neve and other *consorti* had paid the taxes in the past year for a *gatto* that watered an *orto*⁴⁵. A letter sent to the CSO

³⁹ P Racine, *Registrum, Magistrum*, preface, pp. LIV to LXII.

⁴⁰ *Registrum Magistrum*, #240, 494-496.

⁴¹ *Ibid.*, #238, 488-490.

⁴² *Ibid.*, #214, 446-447.

⁴³ M. Cademartiri, “Lo sfruttamento delle acque nel piacentino”, 73.

⁴⁴ *Ibid.* 79-80.

⁴⁵ CSO 2-F1-22, The College degli Inglesi was established in 1579 as a place for young men who had fled their homelands due to persecution against Catholics. In 1581 it was given over to the monastery at San Savino. Information on College d’Inglesi from Gian Pietro Vieussieux, *Deputazione toscana di storia patria*, *Archivio storico italiano*, Casalini

on 6 June 1598 came from Giacomantonio Barbiri and other *consorti*, in this case Alessandro Bachino, Cesari Magiargani and Gio: Batta Moschetti were named. It is impossible to know if the writer used the term *consorti* as an official designation for a legally formalized group with shared business interests or simply to describe the fact that several people were involved in the particular situation⁴⁶. A letter from 1609 spoke of the *vicini e consorti del Rivo della Gosa*, the neighbours and the association of Rivo della Gosa⁴⁷.

Orders issued by the committee often included the *consorti* within their scope. A decree from 1626 was issued about Rivo della Gosa and the Trebbiola, along with the street called Via Nova. It was issued to . . . *tutti li consorti del Rivo della gosia, con chiamato et anco il Rivo detta di Vianova cavati dalla Beverora. . .*, all the *consorti* for Rivo della Gosa and that Rivo called ViaNova, drawn from the Beverora⁴⁸. An order for September 1628 refers to the . . . *consorti della bochetto dalla parte da di sotto del Rivo che passa per l'horto di Sta Brigida . . .*, the association responsible for the inlet of the part of the channel that passed under the garden of San Brigida. They were ordered to clean the canal⁴⁹. Orders that covered a large part of the city or many water channels tended to use a formulaic description of the people involved that called upon all the *consorti*, and those who bordered on the channel named, whatever their class, grade and condition of privilege, to respond with the necessary work in a specified number of days.

Consorti are mentioned in engineer reports as people involved in the complaints about service and requests for infrastructure repairs and upgrades. In a report related to a legal action on 6 April 1704, engineer Giuseppe Cremonese wrote about his visit in the neighbourhood of Santa Maria di Borghetto with Signor Ceresa, the head of the kiln or furnace, and diverse *consorti*, along with the heads of local households. All were

libri (digital version on Google Ebooks) 186, and in Lorenzo Molossi, Vocabolario topografico dei Ducati di Parma, Piacenza e Guastalla: preceduto da cenni statistici e susseguito da un'appendice, (Tipografia Ducale, 1834, digital version on Google Ebooks) 626.

⁴⁶ CSO 2-F5-21.

⁴⁷ CSO 6-P1609-14.

⁴⁸ CSO 6-P1626-1.

⁴⁹ CSO 9-F1-65.

frustrated by the aging infrastructure that provided water to the mill for the Monastery of San Sisto and delivered inadequate service to Sig. Ceresa⁵⁰. In a report from 29 April, 1703 the same engineer gave his opinion to a proposal by Giacomo Peroncino. This last wanted a wall to be located in Cantone Degano, above the banks of the water channel that passed along the kitchen garden in that area. The report discussed whether this would cause a problem for the *consorti* responsible for that infrastructure. The engineer concluded it would not be a problem and the building permit could be issued⁵¹.

Consorti were named in tax documents as people connected to the specified infrastructure. In a tax document of 29 May 1691, engineer Cremonese mentioned an order from the CSO that dealt with infrastructure joined to the Beverora near the house of Sig. Paolo Prelli and the homes of *consorti*. He then assessed the tax requirements by name, length of pipe owned and the rate of taxation⁵². This particular portion of the Beverora had been a problem for some time. It and the *consorti* responsible are also mentioned in tax document dated 21 and 22 July 1690⁵³.

A letter from 1 May 1720 disputes a tax document that had been issued for a bridge and the banks of the Beverora. The writers included the abbess and sisters of San Bernardo, the *consorti* of Rivo Piccinino and a Paolo Prati who owned a mill above the canal San Siro. The *consorti* are named as Bernardino and the brothers Bianchi, Giuseppe and brothers Rattotti, Franco Spiazia and Franco Cattivalli. They contended that the engineer Cremonese had wrongly understood them to be making a profit from the water that flowed through a particular opening from the Beverora⁵⁴. Minutes from a CSO meeting on 21 July 1671 makes mention of the *consorti* of San Siro (San Agostino) particularly where it joined Rivos Meridiano and San Savino⁵⁵.

The documents raise important questions about the *consorti* and their members. How formal were the associations? How many *consorti* had responsibilities along parts of the

⁵⁰ CSO 18-F1702-21.

⁵¹ CSO 18-F1702-4.

⁵² CSO 17-F1691-2.

⁵³ CSO 6-LP-10 and CSO 6-P1659-2.

⁵⁴ CSO 18-F1718-39.

⁵⁵ A3-F1-14.

infrastructure? Could people become members of an association located in varied parts of the city, not just those sites where they lived or owned property? Was membership in an association a kind of entrepreneurial activity, a means of making money? The *consorti* were so ubiquitous to the system that the answers remain murky. There is no explanation of the formal set-up in the CSO documents. It does appear that sometimes there were associations for very specific aspects of the infrastructure. In an expense sheet dated 18 Feb 1641 for the purge of a sewage cistern near San Olderico, the costs reference the association who owned the homes to which it was connected. An order issued on 31 Aug 1728 referred to a *pozzo pubblico* (public well or cistern) and the attached *consorti*. A letter from 1640 was sent from the *consorti del pozzo comune*, the association of the municipal well or cistern. The letter addressed the issue of costs for the clean-out of a cistern that was part of the street drainage system⁵⁶.

A clue to the number of associations for a water channel can be found in the archive, *Acqua di Trebbia, busta 9* where a reorganization of the system in the 19th century is described. The *rivi urbani* were then rationalized into a single society per canal. These societies, even in the 1870's, dealt with the costs of infrastructure work⁵⁷. This implies that the previous management of the canal infrastructure involved multiple parties and *consorti* for each water channel and its associated infrastructure.

The documents do make clear that at least some of the *consorti* were legal entities or could be named as such, though it is unclear from this research if they were able to launch lawsuits in their own name. Two legal documents from 1610 and 1611 reference involved *consorti*. In the case of the record from 1610, an association connected to San Giovanni in Canale was involved. This document is titled *pro consorti*. A concession dated 8 August 1643, also titled *pro consorti*, gave a license to a group of individuals that included Gio: Battista Borla, Giulio Cipeletti Santina, Antonio Francesco Marzolino, Jacamo Franco Balsino and (*altri*) other *consorti* who were connected with Cantone San Alessandro. The issue involved maintenance costs they incurred to clean out a portion of street drainage infrastructure that was blocked and smelled badly. Another document in

⁵⁶ CSO 11-F1-1, 19-P1728-1, 14-F1-36.

⁵⁷ AT-9.

this group indicates that these associations were in the process of dealing with rubble and debris left from the brief war in 1636. A case from 8 July 1661 is titled *pro diversi consorti* and names the Prior and brothers of San Sisto, D Franco Guamaschelli, and *consorti*. A case between San Bernardo and the *consorti* of Rivo Piccinino is dated 5 August 1696. And an unusual reference comes from a lawsuit that involved the *consorti* of the church of San Francesco, the grand canal, and a tenant of a marchese. At least in some cases associations were formalized and legally recognized entities, which could bring lawsuits and become involved in legal cases and proceedings⁵⁸.

If the *consorti* were formal legal entities, then could membership be inherited? Certainly water rights were connected to deeds and could be inherited. If so, then the heirs should have had to assume responsibilities within any established association that managed the infrastructure that pertained to inherited rights. Self-identified heirs are rare in the documents. And often the association with responsibility for the infrastructure is simply identified as a *consorto*, without names of specific individuals. Since infrastructure involved fees and taxes the legal and inheritance information on formalized *consorti* may well be found in wills, testaments, and legal documents rather than in the CSO archives.

An analysis of the documents collected that mention them shows that almost all of the waterways that the CSO dealt with involved associations. Of the specific channels mentioned in the CSO documents only those named as the Beccarie, San Bernardino, the Carmine, the due Rivi, San Nicolo and the channel specific to the *nuovo filatoio* do not mention these associations. Most of these are small, more local channels, many of which would have had a single owner, often an ecclesiastical institution. All the other water channels mentioned in CSO documents are linked to a *consorti* in at least one record. In many of the documents the *consorti*, sometimes along with the names of specific individuals, are named as partners alongside ecclesiastical institutions and millers as being responsible for a water channel. The associations appear to be quite flexible. It is impossible to know if the CSO organized some of the local societies to help manage the

⁵⁸ In order of mention: CSO 6-LP-2, 6-P1609-1, 14-F2-55 and 14-F2-55A and 14-F2-56, AT: A3-F3-1, CSO: 17-F1694-18, AT: A7-F2-5.

canals where there was a gap or a lack of responsible parties, or if they were self-organized entities.

The documents do illuminate the responsibilities assumed by the associations in their management of the urban infrastructure. In a document that involves Santa Maria Quartizola, San Sepolcro, San Bernardo, and Santa Maria Galiverta there is a description of the responsibilities of *consorti*. First, they were all obligated to deal with the costs of the water channel. And each, without dispute and controversy, were mandated to develop the water infrastructure so that they would benefit from it⁵⁹. The document goes on to outline responsibilities towards infrastructure costs and the provision of water for irrigation and mills by this particular consortium. The authorities imposed limitations on when water could be sold for irrigation to safeguard the supply to mills⁶⁰.

It is possible that this document actually pertains to a waterway outside of the city walls with its references to seasonal water requirements⁶¹. Outside the city walls the division between irrigation and the mills was enforced both spatially and socially. Generally documents in the CSO do not speak to seasonal variations for irrigation within the city. Such a seasonal division would have been difficult to enforce as some of the canals ran through gardens in the city and serviced mills both upstream and downstream of the areas of food production⁶².

What this document does show is that the associations were a normal part of the system. It was a public/private partnership that managed the infrastructure. Yet while it appears that societies in the countryside could sell water this does not appear to be always true within the city walls as seen in the CSO archives. Documents that pertain to water

⁵⁹ A7-F1-6.

⁶⁰ *Ibid.*

⁶¹ The waterway referenced in the document is Rivo Parente and mention is made of the Landi and their control of the water from the Trebbia. Santa Maria Quartizola was also located outside the city walls.

⁶² The division of water usage for an *orti* into days of the week is mentioned only once in the CSO for an *orto* within the city walls. Since it is a singular occurrence it is impossible to know if this stipulation was a hold-over from an early agreement, something common to *orti* in the city and just never mentioned in other documents, or a special agreement between the owner and the CSO. See CSO 6-P1701-23 dated 17 April, 1729.

concessions and licenses for infrastructure, and that include fees, were paid to the city, and not to associations. Penalties for non-compliance with terms of water usage, by the users, were also paid to the municipality. The taxes to finance the system were paid to the urban administration. It is impossible to see within the CSO documents how the many urban *consorti* might have functioned in terms of payments for water services and what were their own means of generating profits. Did the CSO act as a conduit for payments by collecting the funds required and then disbursing them? There is no evidence in the CSO archive of payments to associations in relation to infrastructure management. It is quite possible there was a difference in function between those societies who owned and operated concessions in the countryside and those within the city walls. As waterways came under the urban administration through wall extensions there also may have been a change in how they were organized. As the CSO came into its own in the early 17th century it acted as the primary regulator of the urban channels. The upsurge in letters during that time period may demonstrate that the citizens understood this.

How well did the *consorti* function in terms of canal management? Did they get the job done or was the CSO required to push them along on a regular basis? The terms for canal management in the countryside mandate the period from 25 March to 23 April as the time to clean out and repair the waterways in anticipation of summer usage and perhaps as a moment when labourers were available to do the work. This may have applied only to the irrigation canals that came into use seasonally only after that date but nowhere is that stipulated. Concessions frequently refer to this as a yearly activity which meant that residents would have expected to be without the power or sanitation provided by the canals at that time. If the canals were blocked, dried out and cleaned out in the months of March and April in the countryside was that consistent with similar activities in the city?

An examination of *gride* (orders) contained in the CSO documents, which mention specific canals and *consorti* leaves open the question about the period of 25 March to 23 April as the primary time to clean out the urban canals. The *gride* in the CSO records run only from 1556-1685 and cover more than the canals, with inclusion of other urban infrastructure. Thirty-two mention canals and had dates that included the month as well as the year. Of those 32, the month with the highest number of *gride* issued over the 200-

year period is May with ten *gride* or 31% of the total. June was second with six *gride* or 19% of the total. April and July follow, with four *gride* each, for 12.5% each. This is 75% of the total. What this does make plain is that the late spring was the time to deal with the canals, when work was mandated by the highest decree though not necessarily within the dates dictated by the rural regime, though these orders could have acted as reminders to those associations responsible to do the work if for some reason they had failed to do so.

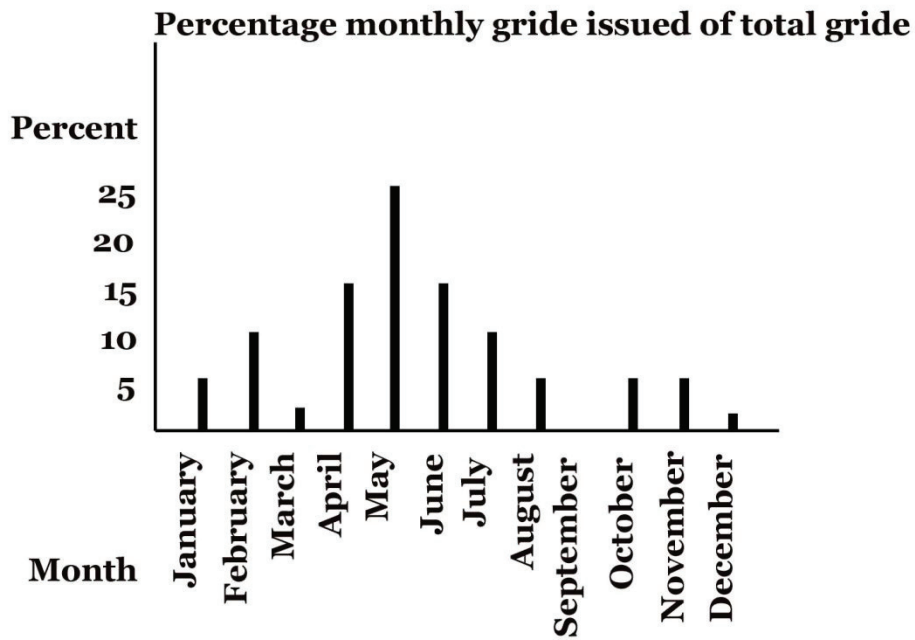


Figure 5-31: *Gride* by month.

Gride tended to be fairly general and often called upon everybody to work on most or all of the urban canals. More specific orders were also used to address single canals or even portions of canals. In this period there were a total of 17 orders of all types, excluding *gride*, issued by the committee that specifically named *consorti*. One dealt with a public *pozzo*, or cistern, and is not included in this survey. Of the remaining 16 committee issued orders, the largest number, four or 25%, fall in the month of April. June, July and September each have three orders (19%), with two in the month of May and one in December. This would appear to support the overall seasonal division which mandated canal maintenance between 25 March and 23 April, except that the actual dates

on the orders for the month of April are: 18 April 1640, 26 April 1640, 26 April 1645, 26 April 1679. Three of the *gride* are also dated for 28 April 1648, 26 April 1651, and 30 April 1671⁶³. Overall, the committee's orders about urban canals tend to be issued after the official period for rural canal maintenance had ended, possibly as a follow-up for canals that had not been cleaned. This raises questions about the link between the system of regulations that governed rural canals and those within the city, despite the physical connections between the waterways. It is possible that maintenance in the countryside exposed particular problems within the city walls that had to be addressed, or else the *consorti*, along with their partners, had a regular schedule of canal maintenance that was faithfully executed and does not show up in the committee documents. Certainly the easiest time to clean and repair urban canals would have been during the period when things were shut-down further upstream in a limited time period. Otherwise, the inhabitants of Piacenza would have suffered irregular service disruptions.

Another way to look at the issue of canal maintenance by associations is to examine the letters written to the committee. Frequently the collectives were the instigators or among several authors of a letter that sought to gain CSO approval of channel maintenance. Many of these letters are undated however. A total of 42 letters have clear dates and involved associations and canals or other infrastructure. Of the 42 communications, 11 are dated for the month of May, or 26%. June, July and August each have 5 or 12% and September has 4 or 9%. This totals 71% of the 42 dated letters. Each of the other months has 1 to 3 letters, except October which has none. It is possible that the maintenance work in the countryside exposed or created infrastructure needs within the city and once the repair work was done on the water channels outside the city, work was needed inside the walls. Thus during the research period, May became a month with the most complaints or comments directed to the CSO about canal maintenance and management issues. Certainly, a canal dredged out upstream from the city would increase the flow of water to the city possibly highlighting needed work. While certain months appear to have been more important months for the maintenance of the urban water channels it is still difficult to directly connect those problems to the maintenance regime

⁶³ The fourth *grida* for the month of April does not specifically mention *consorti* and while it does name Rivo San Savino it is actually focused on street maintenance.

imposed on the rural canals, although, it is possible to see from the letters that the *consorti* and their varied partners took infrastructure repairs seriously. They often initiated the conversation about a particular channel with the CSO which would then lead to an engineer's report, a collection of monies, and an order for repairs and refurbishment.

5.2.4 The ecclesiastical institutions

Prominent in the archival record are the ecclesiastical institutions, the convents and monasteries that filled a large portion of the urban space in Piacenza since the Middle Ages. They were unique in water usage because many of the religious facilities brought together all of the uses of the canal water system. They had domestic sanitation needs and sometimes very large sites for food production. Several of the convents and monasteries had their own mills within the city. Religious institutions are mentioned in all of the different CSO document types. They, often along with partner associations, wrote letters to the committee to complain about problems or disputes with required payments. The committee issued orders to them and could take them to court to enforce compliance. They were taxed for the repairs, and there were occasional disputes between religious institutions over water usage and infrastructure. Many of the men and women in the institutions, especially those in administration, were members of noble families. They had the connections and influence to get work done when needed.

On 28 March 1609 the abbess of San Siro, along with the miller for San Siro, wrote to complain about their neighbours, Fernando Caldirono Milanese and Madero dalla Toscha. These men had tossed various, though not detailed, impediments into the canal against the orders of the CSO. The abbess and miller wished for the CSO to enforce compliance in order to restore the function of the water channel and their mill⁶⁴. In a letter dated 21 April 1616 the abbess of San Bernardo wrote to complain about an infrastructure failure in the Rivo Piccinino which affected another religious institution and a miller⁶⁵. In 1619 the abbess of Santa Maria Annunciata wrote the CSO about a *pozzo da immonditie* in the road, possibly a drainage cistern, in front of the wall of the monastery that was in need of repair⁶⁶. Like other complaints sent by letter to the committee the response might be an engineer's visit followed by the order necessary to see the work done and a solicitation for needed funds.

⁶⁴ CSO 5-P1609-5.

⁶⁵ CSO 7-F1-42.

⁶⁶ CSO 7-F2-42.

The Capuchin Fathers and the Sisters of San Bartolomeo Vecchio⁶⁷

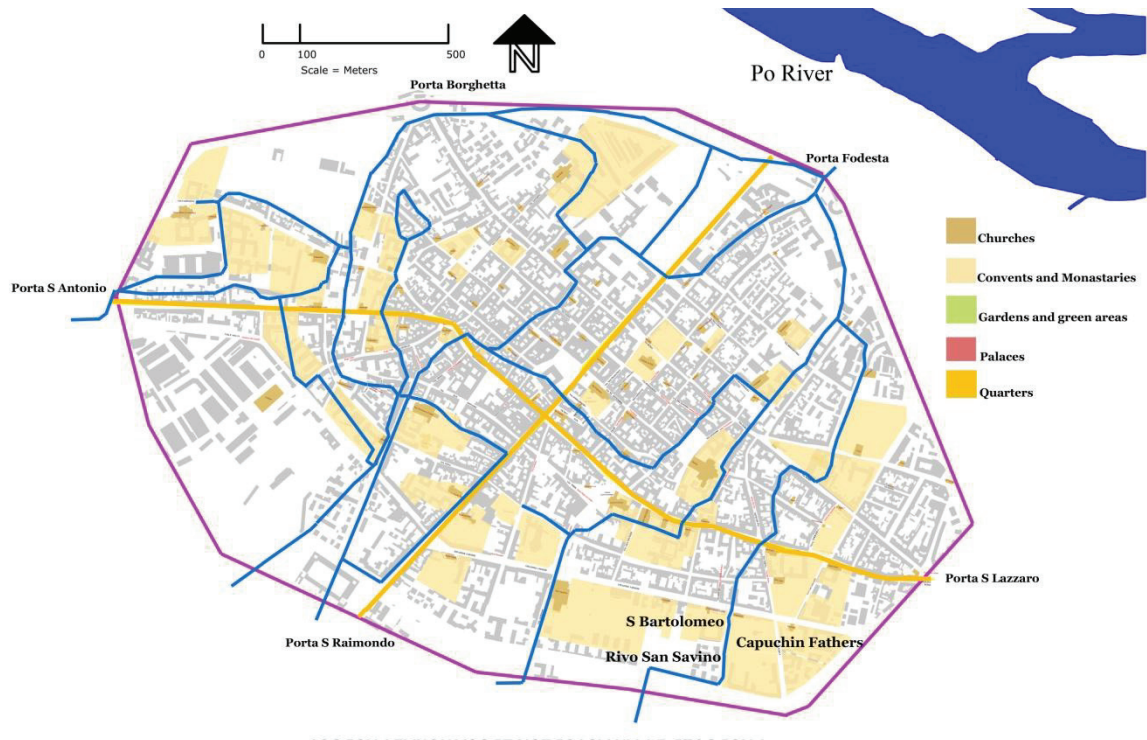


Figure 5-32: Location of San Bartolomeo and the Capuchin Fathers.

A long-running dispute between two religious institutions demonstrates the advantages and the drawbacks of close proximity to a major water channel, the different ways they used water, and the response of the CSO to a dispute. The two ecclesiastical facilities were located at the east end of Stradone Farnese on the inner side of the city walls where the ancient canal of Rivo San Savino entered the city. The canal flowed along the back of the food garden for San Bartolomeo, made a 90 degree turn to run between the two institutions and then crossed Stradone Farnese to continue on through the city.

This dispute begins with a tax document in an archival packet dated 1715, mentions a foundation wall for Rivo San Savino as it flowed to the Capuchins⁶⁸. The explanation for

⁶⁷ The two religious institutions involved were San Bartolomeo Vecchio, first established as a convent in 1096 and the Capuchins, a begging order of friars, founded in the early 16th century. They acquired the property in 1569 when a patron bought it for them.

⁶⁸ CSO 18-F1714-3, 18-F1718-40, 18-F1718-19.

the collection of fees contains further descriptions of the canal and the varied infrastructures required. Another undated document provides an explanation of the disagreement over rights to the canal at that location. This document appears to be a legal report made to explain the situation and to clarify the position of the sisters of San Bartolomeo. It is undated but makes reference to 1716 as a year that has passed. The report could have been written as early as 1717, but further events in the dispute dated in 1720 indicate it was later. The report also lacks an author or signature although the writer is clearly familiar with the situation. It begins with the establishment of the rights of the nuns to the canal Rivo San Savino where it passed beside their property, and notes that the location was also beside a small private pathway that belonged to the nuns. One of the main problems with a proposed wall to be built by the Capuchins on the banks of Rivo San Savino was that the sisters of San Bartolomeo would not be able to perform maintenance on the canal. The costs were generally shared with the Capuchins but the new wall would leave the nuns to manage the canal repairs on their own. Further, the report discusses that, it was still a common observance for the banks of all canals and similar sites to remain accessible for maintenance and give free passage to those responsible to keep the water flowing freely. This common usage had been affirmed in a court case on 5 May in 1716 in a suit between Count Giuseppe Radini Tedeschi and Sig Fortunato Prati and his brothers.

It was further contended in the report that this new wall could cause all sorts of problems for the sisters of San Bartolomeo. The nuns and their gardeners who lived along the canal would suffer from winter floods and ice build-up, which would cause damage to their buildings. The Capuchins had proposed this change even though they knew that the sisters planned to put a new *berline*, or lock, into the water channel in front of the church and monastery of the Capuchins in order to better irrigate their gardens. It was asserted that the new wall design would shut off the irrigation to the nuns' gardens that ran near the Capuchin church. The report cites agreements made in 1688 about the use of the site and canal. If the wall was built as planned then the costs for canal maintenance would rise for the sisters and contravene prior agreements. The document goes on to reference the purchase agreements from August 1569, at the time of the founding of the Capuchin facility that established the boundaries of the small private road between the ecclesiastical

properties, and the parameters of the buildings and gardens. At that time, the stairs of the Capuchin church sat on common land. And despite the claims of the Capuchins, the pathway in front of their church still belonged to the nuns. It was noted that the actual canal was excluded from the site sold by the sisters and purchased by the Bishop of Arezzo for the Capuchins that ran along the small road and the convent of San Bartolomeo. The particular road in dispute, according to the sisters, was established by them for their own use one hundred years earlier and they had always enjoyed its service. If the CSO gave the Capuchins license to build the new wall, then the use of the road was threatened as the Capuchins claimed it was a public rather than private throughway.

The report suggests that the sisters were content with a new wall as long as it followed the line of an old wall that the Capuchins had demolished. This old wall was on the Capuchin side of the canal and kept the ancient canal site free, as it should be. The old wall location meant that San Bartolomeo could clean the canal as it ought, which benefited the Capuchins as well. The document reminded the members of the CSO that the Brothers used the canal to wash their wool and that they really should have been able to do this with the same infrastructure they used to irrigate their gardens. This would minimize the damage to San Bartolomeo whose gardens had already been damaged through previous actions of the Fathers.



Figure 5-33: Contemporary convent garden in Piacenza. Photo by Alessandra Bonhomini, 2009.

In a letter on 22 May 1720, the Capuchins requested permission to engage in work on the wall of Rivo San Savino as it ran alongside their garden edge so that they could better fabricate cloth. The Capuchin acted so quickly that in a letter from San Bartolomeo Vecchio on 16 July 1720, the writer complained that the Capuchins had already constructed the wall and that this contravened the rights of San Bartolomeo. In an effort to regain control of the site in a letter on 22 October 1720 the Sisters of San Bartolomeo applied for permission to build a wall with an ornate gate into their site in front of the church of the Capuchin Fathers. Two diagrams of the proposed construction were included. The final document in the series is dated 9 August 1721 and is a license granted to the Sisters of San Bartolomeo for their own new inlet from the canal to water their garden. It was noted that this new infrastructure was to be located in front of the Capuchin monastery⁶⁹.

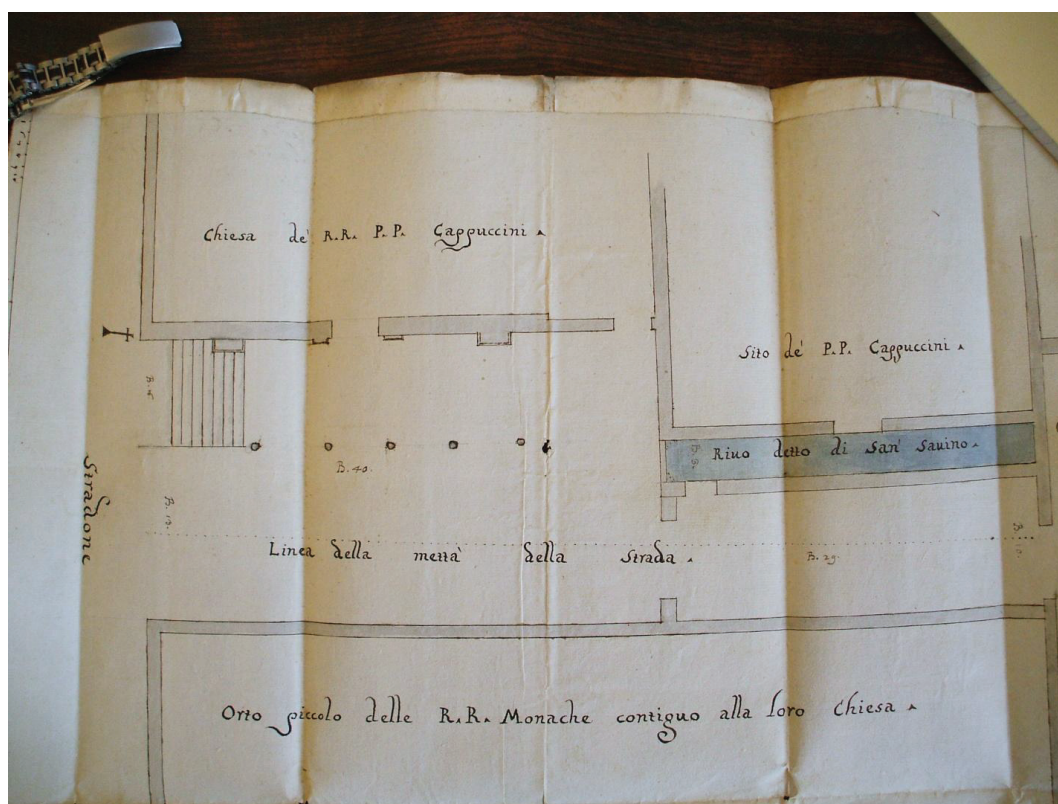


Figure 5-34: Diagram of wall and gate proposed by San Bartolomeo in response to new wall built by the Capuchin Fathers. 22 October 1720. CSO 18-F1718-21.

⁶⁹ In order mentioned in the 3 paragraphs: CSO 18-F1718-40, 18-F1718-19, and 18-F1718-21, CSO 18-F1718-24, 18-F1718-27.

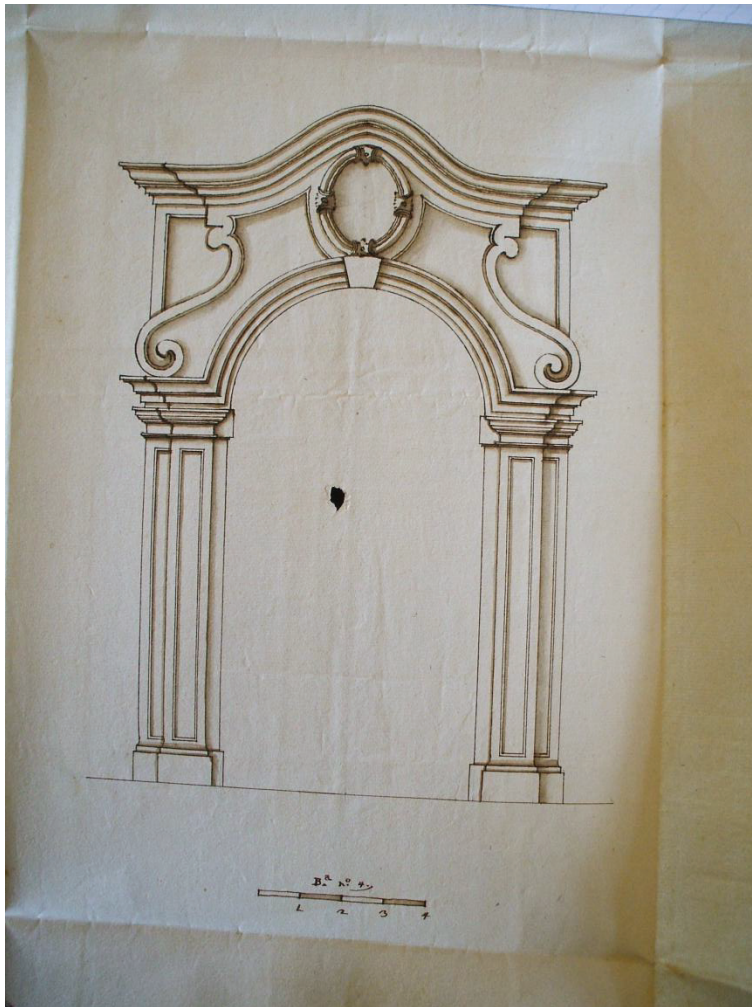


Figure 5-35: Gate proposed by sisters of San Bartolomeo. 22 October 1720. CSO 18-F1718-21.

The location of the two religious institutions, though founded many years apart, was intentional. Both wanted access to the Rivo San Savino and the benefits it provided to their respective facilities⁷⁰. The two religious organizations appear to have had a prior history of disputes over the management of the canal where it ran between their two properties before the contested wall was built in the 1720's. Management of the canal essentially made these two religious institutions into bad neighbours. They both wanted

⁷⁰ San Bartolomeo Vecchio could have been founded soon after Rivo San Savino was dug and therefore would have had a long history in relation to the watercourse.

the water for a variety of uses including street drainage. Located right where the canal entered the city wall, both institutions would have had access to water before it was polluted by its run through the city and was affected by canal management downstream. In other words, in terms of urban water access, both institutions had a great situation, as good as was possible within the city walls. But they fought over that piece of canal. And ultimately the solution, proposed by the Capuchin, was to erect a fence between the properties that would eliminate the disputes. In the end it appears that the Capuchins won the conflict and built the wall.

For those not a part of the two institutions, the new walls around the canal created changes to the space and the allowed access. At least limited access to that portion of the canal was a legal right upheld by the court in the early 18th century. But a glance at the diagram submitted by the Sisters shows the canal walled off for the benefit of the Capuchins. Public or semi-public space became privately managed institutional space although there is no record of the Capuchins having bought the extra rights to privatize the canal. Rivo San Savino ran across the city. This area of dispute was very close to where the canal entered the city; it seems extraordinary that a single user could have simply walled off the canal for themselves, except for the fact that there were no private homes along this particular stretch of the canal, it ran between and along the ecclesiastical properties.

In this case there are no documents in the CSO to explain the thinking behind the decision to give the Capuchins a permit to build the wall. The CSO managed the relational conflict and complaints first through a canal maintenance order in the mid-17th century and then through the construction of the wall in the early 18th century. The CSO could have allowed the wall in an attempt to bring cessation to the hostile relationship between the two institutions. In that case the solution was not complete until the sisters had constructed their own wall and gate. As this research ends with 1736, there is nothing to explain how the two establishments related after the construction of the walls or the implications for canal maintenance and access.

This situation does highlight the role of the CSO in terms of conflict management and mediation of the relations between organizations. The religious institutions must have

used a lot of water due to the variety of activities located on their urban sites and around the city or just outside the walls. To have two institutions locked in a long-standing dispute and bad relations connected to water use, especially on the extreme upstream end of that canal where it entered the city, might have been uncomfortable for the CSO members. To give the Capuchins permission to settle the situation with a new wall may well have been seen as an easy answer at no cost to the city especially as the Capuchins enjoyed the favor of the Farnese. The documents do not give a picture of the informal discussions and meetings that might have gone on behind the scenes to resolve the situation. In a city where many people were connected to one another through kinship, social, business, and political networks, it is difficult to believe that conversations were not going on behind the documents available in the archive. Thus an outcome that appears somewhat arbitrary and even unfair in the documents may well have been arrived at informally first as the best solution to the conflict.



Figure 5-36: Capuchin church today, in the same location. October 2010.



Figure 5-37: Green strip with wild vegetation alongside wall and public road near Capuchin church, possibly the site of Rivo San Savino. October 2010.

5.2.5. The millers

The millers were organized as a guild which oversaw their relationship to the infrastructure, the water, the city, and each other. The head of the millers was called the *Archimulinario* or chief miller. However in the CSO documents there are also references to the *Paratico* of the millers, which may simply be a synonym for guild. The miller's guild book defined the behaviour of the professional members⁷¹. They had to respect the infrastructure of the Trebbia, not divert water from one canal to another, and keep the locks open and the water flowing on holidays and festivals when work was forbidden. Millers were to refrain from closing locks that left a channel dry and were required to put in time to clean the water channels. They paid for the water they took from the Trebbia and its canals. The leader of the guild had authority to collect penalties and fines,

⁷¹ *Collegio dei Mercanti e dei Paratici* (1524-1840), Busta 6: statute – Molinari (1279-XVIII), ortolani (1769), osti (1720), tintori (1776), Book 2: Mugnai 1660, Statuti del Paratico delli Molinari di Piacenza. The paragraph is a summary of the types of regulations found in the book.

especially for disputes between millers and for incorrect use of the water channel. The guild book for the millers recorded these and other requirements for all millers and included those millers in the countryside and those who had floating mills on the Po River. While the book itself is dated 1660, it includes regulations that date back to the 13th century. As such it is impossible to know which of these regulations were still formally or informally being followed during the period of this research. What is clear is that the millers, as a group, had charge of the canal infrastructure on a day-to-day basis. They had the authority to open and close locks and to manage the flow of water, not only for themselves, but also for the rest of the system. They also had responsibilities to ensure the long-term viability of the system as they watched over the infrastructure, cleaned it, and repaired it as needed.

One of the reasons for the guild and rule book was that millers could end up in disputes with one another. Squatriti notes that it was the establishment of the *comune* governments that settled things between those who wanted water for irrigation and those who were using it for mills. But millers also contested water rights with seniority and age of the mill facility used as the determining factor when settling water rights disputes. The author further contends that simple access to a water channel did not guarantee the right to use the water after 800⁷². It was also a long established custom for ecclesiastical institutions, and laymen with the means, to own and rent out the mills. This gave them a fixed income from the mill⁷³. Thus many of the millers in the CSO documents identify themselves as tenants. Running a mill was specialized work. The miller had to be able to manage the hydraulics of the mill, operate the machinery, maintain the water channels, remove silt and debris, and open and close the sluice gates as needed to manage water volume and speed⁷⁴. They needed to be highly attuned to the weather and its effects on the water that came to their mill channel.

Squatriti discusses the social position of millers and the literature that cast them as anti-social, disreputable forces in the early Middle Ages, possibly as they could have been seen as hoarders when there was a grain shortage. But he concludes that at least in the

⁷² Squatriti, Water and Society, 141.

⁷³ Ibid., 147.

⁷⁴ Ibid., 153.

region of Emilia-Romagna, millers were considered agents of the city in terms of managing and processing grain⁷⁵. Municipal authorities were always concerned about the grain supply to urban populations, and enlisted the millers to help maintain the supply. And as this group was also intimately connected with water management for their mills, it also made sense to use them in the management of the urban water utility.

Millers were often named as a profession and as individuals in the orders given by the CSO, and as a group, they were involved in the regular cleaning of the canals. For example, an order dated 9 June 1586 is for a particular miller to clean the Rivo San Savino above and below a mill; an order for 28 September 1596 called on several millers to clean out the Beverora; on 3 August 1682 the miller for San Sepolcro was ordered to clean out Rivo Parente and to do repairs; on 17 June 1585, the miller from the monastery of San Savino was ordered to clean the San Savino water channel⁷⁶. Millers did more than keep the canals clean; they also built and repaired various pieces of infrastructure that were needed for the canals to function well. An order for 6 September 1684 called on the millers along Rivo Piccinino to lower the *berline* in the water channel; another order, for the same task was issued the next day; and on the 28 July 1685, a miller was ordered to build a *gatto* or small water conduit⁷⁷.

The orders were sometimes undersigned by millers by name. These names indicate that millers were often tenants of other people who actually owned the mills. This was a routine situation as mill properties were expensive. An order for 14 September 1585 references a water channel near San Bernardino and is addressed to 4 undersigned millers. An undated note from the early 17th century includes a list of mostly tenant millers and includes: the millers of a number of facilities: for Sig Codi, for the mill of Cattaneo, for the Fathers of San Sisto, for Sig Morarei, for Sig Grescorri, for Melionco, and for Sig Codone. A CSO document from 7 June 1639 mentions the same millers along with others. In this case each miller was assigned responsibility for specific pieces of

⁷⁵ *Ibid.*, 157.

⁷⁶ CSO 2-F1-7, 2-F4-19, 16-P1682-4, 16-P1685-11.

⁷⁷ CSO 16-P1684-6, 16-P1684-3.

infrastructure along the Beverora. An order to millers along Rivo Piccinino which dealt with a *berline* was also undersigned by the millers involved in the work⁷⁸.

Another way to understand the relationship between the CSO and the millers is to examine the letters and requests the millers wrote to the city officials. Most decades only have 1 or 2 letters from millers to the CSO however the decade of 1621-30 surged with 38 or 15% out of a total of 259 letters. The next decade saw an even higher percentage of letters from millers with 39 out of the total of 86, or 45%. After those two decades the number declines to 5 in total for 1661-70 and zero or one for the following decades. *Memoriali* are generally undated but can be placed within a year or a decade. In the decade of 1621-30, a difficult time in the city due to repeated famine and plague, millers wrote to request returns on the penalties or pledges they had given to the CSO. Paolo Tarenco, a miller on the Fodesta, wrote that he had indeed moved the earth taken from the water channel to serve the fortifications, and he wanted his pledge returned. Pietro Franco Rizzi, another miller of the Fodesta noted disagreement with other *consorti* of the canal for his mill over the earth to be moved. He wanted his pledge returned. Giulio Galeano, a miller from the convent of the Madonna de Campagna wrote about an inlet left open by the mill of Tognino Rozasco. He too wanted his pledge returned. Gerolamo Liuisino and Giulio Theresano, both millers, commented on earth removed from the Beverora and asked for a refund of their deposit. A letter from Alesso Bianchi, miller, dealt with the *immonditie* from the Rivo at the partition of San Giorgio and Santa Brigida. He wanted his payment returned. A note on the letter ordered it returned. Guiseppe Boriseglino, a miller at the mill of Sig Paolo Ferrari on the Fodesta, claimed that he did not cause a stoppage of an inlet and due to his poverty should have his deposit returned⁷⁹. In the next decade the *Console of the Molinari* (a leader of the millers), Antonio Rona wrote about an inlet in the road in front of the house of the *Paratico* of the gate of San Giovanni. He laid out the repairs done to this infrastructure and requested a refund on his deposit⁸⁰.

⁷⁸ CSO 14-F1-6 and 14-F1-7, 16-P1684-6.

⁷⁹ CSO 8-F2-32, 8-F2-33, 8-F2-42, 8-F2-71, 8-F2-72, 8-F2-126.

⁸⁰ CSO 11-F2-61.

The millers had a deep connection to the CSO which appears at times to have been cooperative and other times to involve conflict. It seems that the imposition of penalties and deposits not only may have motivated action and labour but also provoked numerous complaints and requests for refunds. It is unclear how, having paid a deposit, the millers then went on to finance the work on the canals, though such work was frequently done on credit. A refunded deposit would then pay for the labour. At least some of them pled financial hardship when they interacted with the committee. This collection of fees and pledges before the work was done may well have been how the CSO financed the work and got it done quickly. It also motivated people to obey orders to avoid fines or obtain refunds.

An anomaly in the CSO records is the book in *busta* 10 for 1633, *Polizia della Città, Controvvenzioni agli ordini disposizioni penali 1630-32*. In it is a record of penalties for failure to comply with committee orders. One dated 10 June, 1630 notes a penalty for the millers of Sig Franco da Lodi and Sig Angelo Maria Guatrinime that involved the earth in Rivo Meridiano. The fine was for 2 *scudi* and was imposed by the deputy, Alessandro Pasquali. Another for 12 October 1631 involved a miller and *rudo*, a *piacentini* term that refers to sewage or a disgusting substance. On 16 October of the same year, a miller for the convent San Savino was fined for an open inlet by San Paolo, again for 2 *scudi*. On 17 November 1631 the miller of San Matheo was fined 2 *scudi* for a break in the infrastructure of the water channel. On 29 November 1631 Giulio Caresano, a miller in the neighbourhood of San Nicolo de Cattaneo, was fined 4 *scudi* for 2 open inlets in the Rivo of San Nicolo. This same miller was fined again on 6 December for 4 *scudi*. On 21 June 1632 the miller for the Fathers of San Sisto was fined 2 *scudi* for an infrastructure break in that Rivo. The fines rose dramatically on 16 July 1632 when two millers were each fined 10 *scudi* for failure to purge the Beverora. The two undersigned millers were from the parish of San Nicolo de Cattaneo⁸¹.

Millers were also involved in legal actions brought by the committee. A *causa* or lawsuit is recorded against the millers on the San Savino channel for the 30 of August

⁸¹ CSO 10-P1633-3B, 10-P1633-3R, 10-P1633-3S, 10-P1633-3X, 10-P1633-3AE, 10-P1633-3AF, 10-P1633-3AN, 10-P1633-3AR.

1586⁸². The relationship between the CSO and millers as a whole involved the day-to-day and yearly maintenance of the canals. It is to be expected that this relationship would not always be a smooth one. At some level the millers were employees of the CSO; however they were actually autonomous contractors who worked for themselves first, and wanted to keep their costs down. The sometimes rocky relationship between the CSO and the millers is exemplified by two individuals whose names appear frequently in the CSO documents.

The first is Rutilio di Lodi (de Laude), a miller present in the accounts from 1585 to 1604. The name Lodi continues in the documents from 1609 to 1629 but is most likely the son of Rutilio, Francesco di Lodi. In all, between the two generations of this family there are 48 documents that deal directly or indirectly with them and their work on the canals, which is about 1.5% of the total number of CSO documents examined for this research. Rutilio di Lodi owned mills and was often in trouble for failure to do the work he was contracted to do on the water system. He was primarily involved with Rivo Meridiano, which would have been just newly built. But as a mill owner he was also responsible for at least portions of other canals. The first mention of him in the CSO records concerns a neighbourhood near the basilica San Antonino and his failure to remedy a problem with flooding. In several situations Duke Alessandro or his son Prince Ranuccio Farnese had to intervene to get the required work done. Di Lodi was mentioned in 17 CSO issued orders and in six legal documents. He appears to have been involved with a substantial amount of litigation.

The other prominent name is Andrea Cattaneo. Documents for this miller begin in 1639. From 1639 to 1650 there are 38 documents that dealt directly or indirectly with the activities of Cattaneo. This is about 1% of the total CSO documents and indicates that this man took up a lot of committee time in a short period. In the decade of 1641 through 1650 he was mentioned in 10% of the letters sent to the committee. Yet the real problems are found in 1646 when Cattaneo was named in 24% of the documents for that year. Andrea Cattaneo was complained about and also complained to the committee and

⁸² CSO 2-F1-14.

quite frequently offered excuses for his failure to comply with CSO orders. The last mention of Cattaneo is in 1651⁸³.

These two individuals and their long running disputes with the CSO and inhabitants of the city exemplify the complexities of the system. A committee of nobles had to administer a physical and social infrastructure with a huge variety of other actors, some of whom were quite independent or had the financial means to actively or passively challenge the control of the committee. Despite the difficulties between the CSO and these two contractors, the relationship went on for years. They were not CSO employees who could be fired for malfeasance. Instead the relationship had to constantly be negotiated to enable the proper maintenance of the system.

5.2.6. The gardeners

The other profession heavily involved in the daily use of the canals were the (*h*)*ortolani*, the gardeners and small farmers who cultivated the land within the city walls. However, as noted in chapter 4, it is also quite possible that those that listed their profession as (*h*)*ortolano* in the tax documents did not all work within the city walls. The land outside the fortifications was cleared to enable defensive sightlines and it was cultivated with crops for sale in the urban markets. Farmers could easily have walked to work beyond the walls to their plots. Yet much of the land inside the city and much of the CSO's time was occupied with urban land-use that involved food production. Skilled management of the water channels was vital to maintain and promote this urban agriculture.

The gardeners had more responsibilities than mere land management. Like the millers, they had to manage the water channels that ran alongside or through the gardens and small farm plots. Many garden plots were located along the canals so their water use would have affected mills and other artisanal activities if mismanaged. Like the millers, the gardeners are present in every type of document within the CSO archive. They were

⁸³ For a complete analysis of documents that pertain to di Lodi and Cattaneo see *Appendix C*.

addressed as a group in various orders and *gride*, wrote their own letters to the committee, and were the subject of complaints by other inhabitants of the city.

An order dated 5 July 1586 commanded all of the undersigned gardeners near the church of San Bernardino, who used water from the canal San Savino for irrigation of a garden plot, to repair the channel within eight days⁸⁴. An order from 7 July 1590 dealt with the *gatto*, or conduit, that belonged to San Bernardino and involved the gardener in its supervision. Another proclamation for Rivo San Agostino dated 13 September 1599 was specific to the gardeners and the administration of an inlet to the canal. Decrees mention gardeners as a group along with other artisanal groups who had responsibility for specific water channels. In a decree from 8 November 1601 that focused on the Beverora and its offshoot Rivo Meridiano, ‘*tutti gli hortolani*’, all of the gardeners, are named as also responsible for the call to action to repair and clean the canals. An order from 15 June 1639 lists millers, dyers, and those who processed hides, along with the gardeners as people who had commitments to the Beverora and its repairs. An order from 19 July 1645 commanded all the undersigned gardeners to use *berline* (locks) of wood in order to close off portions of Rivo San Savino when they irrigated their plots. Twelve names are undersigned and include at least one tenant gardener and a woman, Signora Bramiera, perhaps the owner of one of the sites irrigated by the San Savino water channel⁸⁵.

The gardeners also appear in letters written to the committee, sometimes as the source of complaints. A portion of a letter written in the early 17th century to the CSO concerns the monastery San Raimondo and Rivo della Gosa. In it there is a discussion of three inlets to the banks of the monastery to irrigate the garden tenanted by Andrea Casappa. The water was also to be used for a *peschiere* (fish pond) in the farm plot. Another letter to the CSO dated 30 July 1611 details how after the Beverora was cleaned, there was a problem with the inlet into the channel that served Via Nova which did not allow the gardeners to irrigate their plots. The writer wanted the inlet fixed. A long letter from the

⁸⁴ Most often in these documents millers and gardeners would sign their names as a form of agreement with the orders given by the CSO. They were not normally named in the document unless it applied specifically to them.

⁸⁵ In order of mention: CSO 2-F1-4, 2-F1-24, 4-F1-24, 4-F4-3, 14-F1-1, 11-F1-35, 11-F1-36.

Prior and millers of San Savino in 1640 detailed the poor condition of the San Savino canal as it conducted water to the city. This problem continued despite the constant care and repair by the millers, the *consorti* and even the masons. The problem was located in how the gardeners were dealing with the channel. This had created a conflict between the gardeners and their *Padroni* and the millers and their *Padroni*. The situation was a mess with a broken water channel and dysfunctional mills. The writer pleaded with the CSO to bring justice to the controversy and deal with the costs of canal maintenance. Carlo Giometti, gardener, sent a note to the CSO in 1642 to acknowledge an order that he had fulfilled to deal with Rivo della Zecha (Zecca) and he wanted his deposit returned. In 1646 the Mother of the nuns of San Bartolomeo wrote about the need for repairs to the conduit that passed along the street of San Bernardino. Much damage had been done to San Bartolomeo due to the lack of repairs and their gardener had suffered as well. The nuns were poor, she claimed, and their gardener was unable to do the repairs. In addition, the problem meant that they had water in the house and basement with much damage, to the convent and to the gardener's residence. In light of the damage they requested a license to effect repairs. The CSO granted the license ⁸⁶.

While irrigated garden plots were a special tax bracket in tax documents the gardeners as a profession were also present. Records for specific canal repairs list the gardeners involved with the sites. In a tax document from 17 October 1598 for fees collected to clean out the Beverora, the gardeners listed take up a page with payment to be directed to their *padroni*. Further pages of the document included those living near San Raimondo, *tintori* (dyers), a page for San Giorgio, those along Via Nova, and the millers in the Borgo. A solicitation list for Rivo della Gosa in 1619 to build a wall at Strada Farnese lists all of the inlets that were owned by individuals or convents and at the end reads '*il buccello di rianzo Ang ortolano*', the inlet for the garden located along the Rivo. A list or bill for costs in the purge of an underground conduit near the castello dated 1687

⁸⁶ In order of mention 2-F1-22, 6-P1609-3, 7-F1-4, 7-F1-5, 14-F1-41, 14-F2-29, 11-F2-59.

includes a line about expenses for Giuseppe Paratico *ortolano*, who was noted to have been also listed on 28 May 1687 for a total of 31 *lire*⁸⁷.

As with any major water user, the gardeners were also involved in court cases with the CSO and others. A packet that concerns San Agostino and the Rivo San Savino, possibly outside of the city walls, from 30 August 1645 chronicles an ongoing dispute between water users. It names a seven-year conflict between Lazaro Pellone, gardener, and several different food and ornamental gardens, all of which needed irrigation water. On the back of the page there is what appears to be a confession by an unnamed worker from the garden for San Agostino. He testified that he was originally from Bobbio and was 28 or 29 years old. Years earlier he had come to work with the gardener, Stefano Besrelli, at San Agostino. His testimony involved the particular days of the week, Thursdays and Fridays, during which the monastery was to irrigate their agricultural plot from Rivo San Savino. The location of the plot, on Rivo San Savino for the monastery of San Agostino, and the obvious *quindicena* regime described for irrigation, most likely places this plot outside of the city walls but clearly close by. A small packet possibly from 1645, contains a legal document that also involved Rivo San Savino, gardeners and the miller Cattaneo along with a D. Bilegna. The inscription at the top, '*pro Cattaneo*' indicates that Cattaneo may have won this particular case. It is unclear whose side the gardeners supported. Another case from 10 September 1645 is also about Rivo San Savino and involved a garden owned by Sig Camillo also named as the *Podestà* of Sig Marchese Cremona and rented to the man who made the confession. This particular confession also entailed an irrigation regime based on allotted days of the week. Since all of these cases involve Rivo San Savino and irrigation issues they may well have been connected to whatever problems plagued the Rivo that summer⁸⁸. As a low status group the gardeners would have been at a disadvantage in court cases.

⁸⁷ In order of mention A12-F1-3, 7-F2-41, 15-F1-5.

⁸⁸ In order of mention: CSO 11-F1-28, 11-F1-30, 11-F1-41.

5.3. THE MANAGEMENT OF THE SYSTEM

Systems such as that in Piacenza require means to encourage and enforce compliance with the agreed upon rules. Water needed to be kept flowing and in some cases to be kept clean. The CSO utilized specialists to provide expert analyses of the canals and other aspects of the utility. They also taxed and imposed fees and penalties not just to cover everyday costs but to encourage inhabitants to care for the infrastructure in timely ways. These types of management techniques were meant to encourage cooperation and to penalize noncompliance, to reduce the possibilities of conflict. This section examines the role of the professional engineers, the cost of water provision, pollution, and penalties.

5.3.1. Use of Specialists – the Engineers

Reports by technical experts were used not only to explain and solve problems but also to add the weight of authority to CSO rulings. During the Farnese era, the use of engineers to lend expertise to the system management increased as the years went by. In her book on the Trebbia water system⁸⁹, Poli lists the names of the men who headed up the water utility in Piacenza as technicians and engineers from 1285 to 1790. Her archival sources include the *Acqua di Trebbia*, *Rivo Parente*, and the *Provvigioni* collections. A comparison between Poli's list and CSO records confirms the employment of some of the names found on reports filed within the CSO. CSO records fill in the gaps in Poli's list. Two items of interest stand out in a list of engineers and other specialists involved with the CSO. One is the existence of a dynasty who served as city engineers, the Cremonesi, Alessio, Giuseppe and Bartolomeo, father, son and grandson. There are dates where their work overlaps and indicates that generations served together. The other intriguing situation involves the reports written by Count Cristoforo Landi. He signed his reports as *eletto*, that is, a member of the city council, rather than an employee. Why would an aristocrat like Count Landi write reports for the CSO when he was not an employee or an engineer?

⁸⁹ Valeria Poli, Le acque di Trebbia tra città e contado: norme, magistrature e uomini, dal 1420 al 1806, (Piacenza: Banca di Piacenza, 1995),106-108. For a comparison between Poli's list and names in the CSO see *Appendix D*.

The first Landi report was penned in response to a letter sent by another noble, Antonio Luigi Arcelli to the CSO that dealt with the Rivo del Carmine in 1626, a short length of canal specific to the Carmine convent which appears to have been located near Arcelli's residence. The second, a 1627 report on a visit Landi had made, detailed an everyday issue about a lock left open, *immonditie* and necessary repairs. The final report dated 2 August 1627, by Landi, could actually be a *memoriale* as it appears in that form. In it Count Landi made an argument on behalf of several men he described as poor. He proposed, perhaps as their patron, forgiveness of the penalties they owed for use of Rivo San Savino. A note on the inside of the letter indicates that the CSO was happy with the information provided by the Count⁹⁰. The factor that connects these disparate issues is simply the fact that Count Landi wrote the report or letter rather than an expert or engineer. There is no information to indicate why the Count took this action though he may have had training as a military engineer. According to the records, Trompelli, who wrote a report in 1626, should have been available. Poli's information shows that Cornelio was appointed in 1627. There was perhaps a time period when there was no one else to do the job or for some reason Landi simply chose to intervene. Otherwise the reports were done by those whose training and affiliation made them experts or authorities on the infrastructure of the urban water system.

The engineers' reports over the 200-year period provide at least one surprise, that is, the discrepancy between the number of committee actions related to specific canals and those canals that were the focus of engineer reports. The chart of canals as a percentage of total actions within the CSO placed the Beverora first followed by Rivo San Savino, Rivo della Gosa, and then the Meridiano. The engineers' reports show a slightly different story. If all of the sites mentioned in the engineer reports are mapped against the local canals and totalled over the 200-year period, then the Meridiano merited the most attention from the experts. The various sites associated with the Meridiano: San Lorenzo, San Donino, the meat market, and Piazza Grande are mentioned a total of 24 times in the engineers' reports and required 18% of their time. The Meridiano ran through the site of San Lorenzo and then into Rivo San Agostino and Rivo San Savino. If mentions of San

⁹⁰ In order of mention: CSO 8-F2-100, 8-F2-118A, 8-F2-134.

Lorenzo are included along with San Bernardino, Porta Fodesta, S Bartolomeo Vecchio, San Savino (the convent), and San Paolo, then Rivo San Savino has a total of 23 mentions in the reports and 17% of the engineers' time. The third most frequently mentioned canal with associated sites is San Agostino for 14%, while the Beverora comes in at fourth and 12%. This means the primary focus over 200 years, for all city engineers, were the canals in the eastern portion of the city. It was often the connectedness of the three water channels, the Meridiano, San Agostino and San Savino that made them a focus for the engineers. Of course, not all engineer reports involved canals or associated sites. Some are specific to rain water or street drainage, but the reports that mention canals and associated sites are focused first on the eastern portion of the city and its water provision.

A series of documents from 1671 illustrates the problems with one of the canals of the eastern side of the city and the role of the engineers. While not all of the documents involved are dated, a possible chronology shows that out of 20 documents in total in this sequence, 8 or 40% are reports to the CSO and most of those by named specialists. This sequence is a conversation that went back and forth between the inhabitants, the experts and the committee for the summer of 1671 until the problems were elucidated, organized, and then hopefully addressed through repairs. This series also demonstrates the complex issues that faced the longer canals like San Siro/San Agostino and San Savino. They covered a lot of different terrain with the potential for breakdowns in infrastructure and pollution from diverse sources. In this case three sites were the source of major concerns about the water channel San Siro. The first was where it entered the city at the monastery of San Agostino. A bit further on, it had the potential, through an offshoot, to cause problems in piazza San Antonino and in neighbourhood gardens that included a number of monasteries and convents. As it continued through the city, the next site for ongoing difficulties was the area where it first joined up with the Meridiano at San Lorenzo, and then along Via Trebbiola as it ran to meet the water channel San Savino. The final point of distress was the mill of the Fodesta near Porta Fodesta as the now combined waterways exited the city. In this situation the CSO made use of several people which included various engineers, to give them information on the canal to validate the repairs and the costs to the waterway.

5.3.2. Infrastructure Investment and Maintenance as a Means of Regulation

The cost of living

In the modern, developed world, water has been underpriced and undervalued. Generally, water costs have been infrastructure costs and the water itself has been free or nearly so. Due to the overuse and misuse of water some jurisdictions are now making changes to raise the price of water. In Early Modern Piacenza people frequently paid first for infrastructure as the fee they paid for water use. Was the water considered cheap or expensive by the *piacentini*?

To understand how someone in Piacenza would have experienced their water service and its costs, it is necessary to have some sense of how much money people earned in a year. This is not an easy calculation and can only be broadly guessed at. Some locales, such as Florence and Milan, for some dates, have precise information on wheat prices per year, or mason's wages per day. But that information, to date, is not available for Piacenza. As every city had its own system of measures and coinage, it is not possible to directly translate information from one locale to another. Therefore, the following analysis can only be a rough estimate of what people had to live on in Piacenza during the Farnese reign.

Class structure, whether one was titled nobility, untitled nobility, a merchant, artisan, or one of the common people often had an impact on annual income, but it was no guarantee of reliable revenues. There are millers in the CSO archive who are tenants of another miller which implies possibly significant differences in wealth. In fact these millers sometimes argued poverty when presented with CSO bills. But there are also obviously millers who would have done quite well. A look at Romani's examination of the *estimi* and Subacchi's analysis show nobles with quite large incomes and wealth and others of equal status with much, much less⁹¹.

⁹¹ Marzio Romani, La gente, le occupazioni e i redditi del piacentino and Paola Subacchi, La ruota della fortuna, especially chapter 2.

What class and income did determine to some degree was type of usage for the water resource. The convents and monasteries also varied in wealth as well as size, but were social collectives, and often had mills, gardens, and residential uses to contend with. Millers had to purchase the use of the water in their channel with some of the payment in sweat equity in canal management. Gardeners, almost always tenants or wage labourers, or their landlords, also had to purchase water to irrigate their gardens or meadows inside the city walls and some were responsible for the physical work of inlet and drain management. Dyers and those who worked with skins needed large vats of water for the necessary chemical processes. And individuals depended upon water piped into their homes and in cisterns as a means of dealing with everyday sewage. The varied classes of people in Piacenza, dependent upon their means of income and level of wealth, would have used the water channels in different ways and have borne the costs differently.

The 17th century in Italy is generally understood to be one of stagnation and deflation in terms of the prices of consumer goods. Certainly Paolo Malanima affirms this. His economic calculations tend to identify the prices and wages from 1420-1440 as the high point followed by a long, slow decline until the 19th century. The period of the 17th century was one of more stable, less dramatic movement in the cost of living and worker wages, though clearly in decline after 1635. Yet, there were variations that would have affected the cost of living, especially for those in lower income levels.

Malanima tracked grain prices from the 14th to the 19th centuries in Florence, Italy. There, for example, in 1544-45 a *staio* of wheat (a dry measure of grain that varied in amounts between cities) sold for 42.3 *soldi*⁹². Changes in grain prices were generally

⁹² The measure of a *staio* varied from city to city, sometimes quite significantly. In Piacenza, a *staio* equalled 15 *copelli* versus Parma where a *staio* was only 12 *copelli*. The Piacenza *copelli* is 2.3 litres for a total of 34.8 litres for a piacentino *staio* of wheat. That would weigh around 27.84 kg. Malanima used a Lespeyres Index to figure that the average food basket held 120 kg of wheat per year to be supplemented with another 120 kg of millet or later maize. He does not indicate whether this is a basket to serve an individual or several persons. Assuming Malanima's food basket is for an individual, the average piacentino would have needed 4.3 *staios* of wheat per year. For further calculations see Paolo Malanima, *Price Index, Italy 1250-2007*, <http://www.paolomalanima.it/DEFAULT_files/Page646.htm> 2008. To access

driven by shortages and famines, and seasonal availability. The prices fluctuated monthly, especially when it was necessary to import supplies. Malanima's work on Milan prices shows a similar rise and fall pattern⁹³.

While lacking information on Piacenza, a graph is available in Subacchi's book for the other main Farnese city, Parma, during part of that time period. In this case the graph is in *soldi per staio*. The way the graph is constructed makes precise calculations impossible, prices can only be approximated. In Parma in 1580, a *staio* of wheat was around 190 *soldi*. By 1590 the price had risen to an estimated 400 *soldi* during a famine, and then it dropped by 1600 to around 250 *soldi per staio*. And there it stayed for the most part until the famine of 1630 when the price of a *staio* shot up to 500 *soldi*. By 1640 the price had dropped significantly to 160 *soldi* but had risen again at the end of Subacchi's graph to around 700 *soldi* in 1650 related to a famine of 1649. While prices overall were stable during this period, these occasional fluctuations, short-term, often crisis driven, price rises, would have had tremendous effect on low and middle income households⁹⁴. Unfortunately Subacchi's graph is both incomplete for the time period and not very

measures for Italian cities see: Ronald Zupko, "Italian weights and measures from the middle ages to the nineteenth century (memoirs of the American Philosophical Society)", American Philosophical Society, 1981.

<<http://books.google.ca/books?id=GrVoh1JxRRAC&printsec=frontcover&dq=italian+weights+and+measures&hl=en&sa=X&ei=3XYcT-dV6uzSAerxhK8L&ved=0CDsQ6AEwAA#v=onepage&q=italian%20weights%20and%20measures&f=false>>.

⁹³ Malanima, Consumer Price Index, Italy 1250-2007, Milan figures are from p. 29.

⁹⁴ Subacchi, La ruota della fortuna, 134, there are no precise figures in her graph. The numbers have been roughly interpreted in the paragraph above. Note, that a Parma *staio* was only 12 *copelli* and there was no information available on how many litres this would be or how many kilograms of grain were in this measure. But if it is assumed that the Parma *lire* equalled 20 *soldi* like that of Piacenza, then the price in *lire* for grain in Parma over the course of the 200 years was: 1580 – 9 *lire* and 10 *soldi*, 1590 – 20 *lire per staio*, 1600-12 *lire* and 10 *soldi*, 1630 – 25 *lire*, 1640 – 8 *lire*, and 1650 – 35 *lire*. Presuming a crude equivalence between a Piacenza and Parma *staio* then 4 *staio* would have cost roughly between 36 and 140 *lire* in Piacenza during Subacchi's time period. If the Parma *staio* was slightly smaller than that in Piacenza yet prices were equivalent then 5 *staio* might be needed in Parma for the year for a cost of 45 to 175 *lire* annually. The price is the same in 1640 as it was in 1580.

detailed. It is impossible to get a clear understanding of the movement of grain prices during the Farnese period.

Zilocchi tracked the prices for meat in Piacenza over several hundred years that include the Farnese reign. Meat prices were controlled by the city and set twice a year, at Easter and on San Michele Day (September 29). Thus the city would have been able to hold prices steady for a long period. Yet in a report from 1574 to the city it was understood that prices for veal had risen 80% in the previous 9 years. That would have been a significant cost to people. Prices were also an issue in 1630's when cattle in the area suffered from a contagious disease. Yet, Zilocchi makes clear that prices overall stagnated, along with the economy in the 17th century especially after Odoardo Farnese's war (1635-37)⁹⁵.

Beyond wheat and meat did other costs rise or stagnate during this period? The only consistent material to test in the CSO documents is *quadrelli*, the small bricks or cobblestones that were used to construct the infrastructure and their cost did rise nominally over the 200 year period. In a bill by Bolzoni, from a sequence of documents from 1606, the *quadrelli* cost 0.025 *lire* per unit, or per brick. By 1628 they had risen to 0.033 *lire* per unit. By 1687 the cost of *quadrelli* had risen to 0.045 *lire* per unit which is essentially where it remained as shown by a final bill in 1691 with *quadrelli* at 0.04 *lire* per unit⁹⁶.

This type of information only makes sense though if it is possible to understand what kind of income was available to people. In his work on wages in Italy from 1290-1990, Malanima examined the wages of masons or master builders in Florence. Like prices overall, there was a peak in 1420-40 with a slow decline until the 19th century. However the era between 1530 and 1730 shows a small increase overall amidst the ups and downs

⁹⁵ Zilocchi, *I Tormenti della Carne*, 35 – 36 discuss the report, see p. 51 for the cattle disease in 1630. Zilocchi reports on prices over several hundred years all throughout the book.

⁹⁶ CSO bills that include the cost of *quadrelli* and how many units were purchased include: 5-F2-8 is the bill from Bolzoni and is in a sequence of documents for 1606, 9-F1-28, 13-F1-36, 15-F1-2, 15-F1-6, 15-F1-7, 17-F1691-13. A 100% rise in prices per century is an average of 1% per year but in reality would have been less for a nearly zero inflation rate.

over these 200 years. After 1680 wages began to drop again until they hit a low in the late 18th century. Malanima found records for a *muratori* (a mason or bricklayer) from the 16th century for daily wages of 2 florentine *lire*. He calculated the year's wages based on 260 days of work per year. For 1540-50 a mason in Tuscany earned 297 *lire*/year, in 1630, the year of famine and plague, a mason could make 553 *lire*/year, almost double what the wages had been 100 years before. The figure for the decade of 1730-40, the final decade of this research, puts a mason's yearly income at 520 *lire*⁹⁷. As these were skilled craftsmen in a major, capital city their wages would have been higher than the average labourer.

Within the CSO archive, there is little to draw on. A few bills to the committee stipulate the day wages for masons and labourers. The wage to masons rose, but only by a small amount over the 200 year period. The earliest bill to give a mason's wages in the CSO is from 1657 and noted that for 3 days of work the mason had been paid 7 *lire* 10 *soldi*. This would work out to a day wage of 2 *lire* and 10 *soldi* per day⁹⁸. In 1687 that wage rose to a normal 3 *lire* per day, although, one of the bills from 1687 specifies that the wage also included wine, a cost that was generally figured in separately⁹⁹. This information, while it only covers 30 years, does show the trend for wages to rise at least slightly, after the famine, plague and war years of the 1630-1640 decade. It also means, that calculated on 260 days of work per year, a mason in Piacenza earned about 780 *lire* per year or about 100 *scudi*. Family income would have also been supplemented by the work of the wife and children, especially in the textile trades.

⁹⁷ Paolo Malanima, *Wages, Italy 1290-1990*, pp. 15-18.

<http://www.paolomalanima.it/default_files/Italian%20Economy/Wages_Italy_1290_1990.pdf>. 2008.

⁹⁸ In Piacenza, as in all Italian states at that time, currency was a complex and shifting issue. However, for the purposes of this work the values are as follows: A *scudi* (of silver or gold) is worth 7.25 *lire*. A *lira* is worth 20 *soldi*. A *soldi* is worth 12 *denari*. Most infrastructure costs and tax assessments are expressed in *lire/soldi/denari*. Many of the penalties are expressed in *scudi*. Presumably a gold *scudo* was worth more than a silver one but this information is not available.

⁹⁹ CSO bills that show wages to masons include: CSO 12-F2-60, 15-F1-2, 15-F1-6, and 15-F1-7.

The wages for day labourers in the CSO archives are more difficult to calculate. The bills are often for unspecified groups of workers and are not broken down for individuals except for the masons. A bill from August 1683 to the CSO records the amounts spent on labour for repairs to Rivo San Agostino. It gives the cost for labour by day. Six days of labour each was worth 7 *lire* 10 *soldi*, 5 days was valued at 6 *lire* and 5 *soldi*, 4 days were worth 5 *lire* and on another day 6 *lire* and 5 *soldi*. If this is indeed per worker then the labourer was making about 1 *lire* and 5 *soldi* per day¹⁰⁰. In rough terms a labourer made about 1/3 the wages of the master mason or about 1*lire* per day overall. At 260 days of labour per year then, the average worker made 260 *lire* in the 17th century. Again, other sources of income within the family may well have supplemented that amount and would have included labour by the wife and children and given such a family a possible overall annual income of around 400 *lire*. Out of that would have come rent, food, clothing, and taxes along with the expense for water service if they had it.

The cost of water

The billing situation for the CSO is multifaceted. It involved licences to construct infrastructure and irregular solicitations to pay for repairs. Due to the irregular nature of the tax lists and repairs there is no way to clearly figure out an annual cost for water service. A letter from several people in the 1640's mentioned that a house, with a number of different names on the letter, paid 24 *scudi* (about 174 *lire*) per year for water service and that included drainage for rain water. The writers complained about flooding in the basement. It is impossible to know if this amount was a flat fee for water service because such a figure is given nowhere else. That amount would be more in keeping with the penalties incurred due to lack of compliance with an order or *grida*. It is far more than anything that would come from one of the solicitation lists and tax documents. It is unclear what exactly the writers are referring to with this sum. Such a fee would be quite significant for a single family of a day labourer or even someone like a mason but could represent several households within the building¹⁰¹.

¹⁰⁰ CSO 16-P1684-2A.

¹⁰¹ CSO 11-F1-7.

A detailed examination of billing also shows that it is impossible to determine if fees rose during the 200-year Farnese rule. This is because the CSO utilized various ways to bill people for water from the length of the pipe to their house, to the amount of land they irrigated and the occasional flat fee. And the tax documents, while they frequently are precise in their description of the infrastructure involved and its location, are not precise enough to always know which part of what canal was actually under discussion in a single document. It is impossible to trace costs for a canal over time and thus also impossible to know what any particular individual paid for the water utility.

When someone wanted water service they generally had to pay for the infrastructure first. This was also true for the installation of a cistern either by an association or by an individual household. A 1606 license for a household cistern cost 1 *lire* 10 *soldi*. In 1611 a license for similar infrastructure work granted to the convent San Raimondo was 2 *lire* 3 *soldi*. Another application for a license for a cistern in that same period cost 1 *lire* 13 *soldi*. In 1617 a householder wrote the CSO to explain that he had failed to pay for the license for a cistern in his house. He was billed 3 *lire* 10 *soldi* but there is no indication if this is a license or a license with a penalty. In 1621 a cistern license cost 3 *lire* 10 *soldi*¹⁰². This demonstrates a rise in the license fees in line with the discussion of other fees. At 1 *lira* per day earnings for a day labourer, 3.5 *lire* for one's own basement *pozzo* might well have been a good price even though that does not cover the required maintenance and cleaning.

After the initial infrastructure investment, the utility customers had to pay for upkeep, maintenance and improvements to the infrastructure. This is a difficult area for which to tease out precise information in the CSO archives. Generally, when funds were needed to finance repairs, the engineer or deputy drew up an explanation of the infrastructure requirements, their location, and the total costs anticipated. Then a solicitation list was assembled that included a few or up to many pages of names with fees charged. The total for the fees charged usually equals the estimated anticipated expenses. There appears to be no real rules for who went on the solicitation list. Obvious persons were those who used the particular infrastructure, or who lived alongside a specific water channel, and the

¹⁰² In order of mention: CSO 5-F2-23 , 7-F1-1, 7-F1-3, 7-F2-16 and 7-F2-16A, 7-F2-55.

various *consorti* who were mandated by legal agreements. But some of the lists appear to have expanded as there was need with hundreds of names on them and institutions that were located quite far from the infrastructure in question though they may have owned property nearby. Likewise millers often undersigned orders to repair waterways located far from their own particular mill. And to add to the complexity of the issue, the CSO utilized diverse methods to rationalize billing over the years.

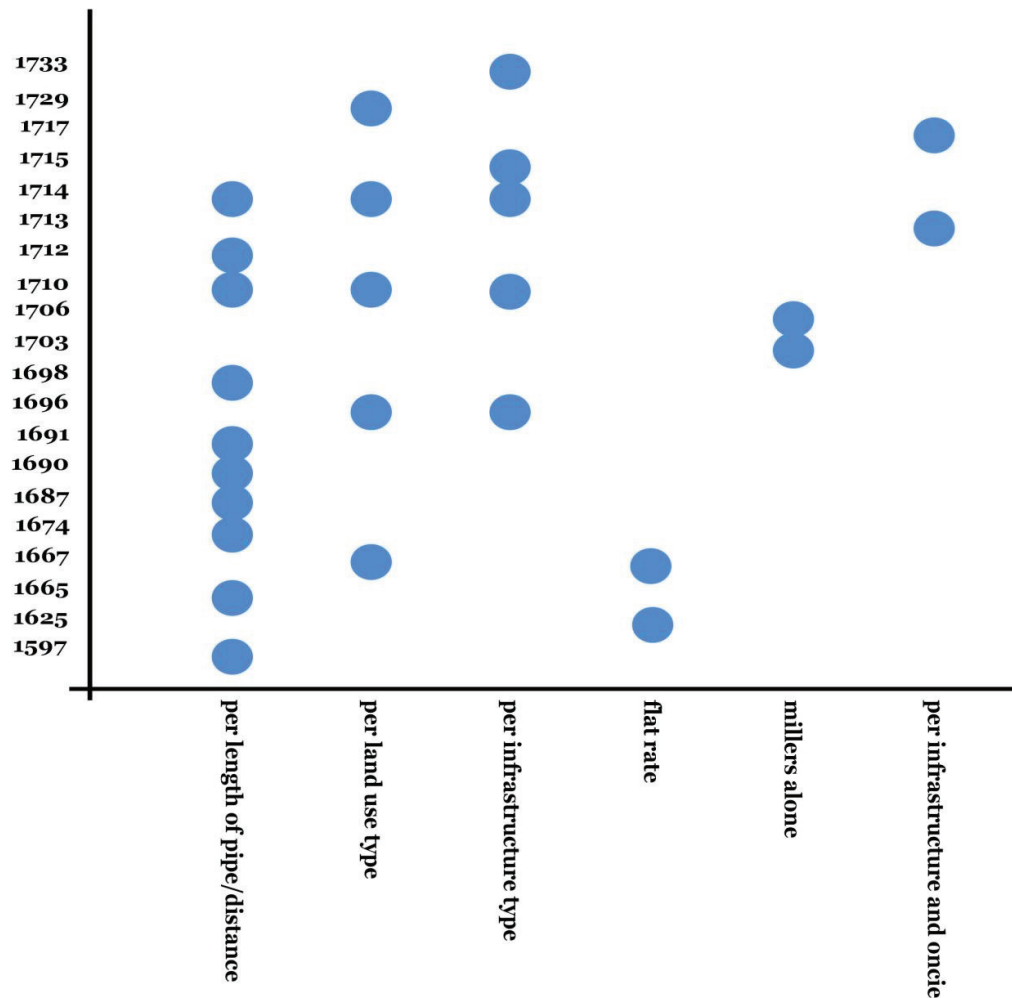


Figure 5-38: Types of fees for water usage.

The most common means of billing for the CSO was by length of pipe from the water channel to the user. Not all bills stipulate the actual fee per linear measure, but some show the progression of costs to the customers. A bill from 1674 calls for 3 *soldi* per

braccia (48 cm) in length. In 1687 the price ranged from 8 *denari* per *braccia* to a high of 4 *soldi* for the same measure. In bills from 1690 the cost moved up to 7 *soldi* per *braccia* with a surcharge that brought the real cost to 9.5 *soldi/braccia*. The fee decreased and in 1714 was only 2 *soldi* and 6 *denari* per *braccia*¹⁰³. The range in the numbers, with such varied amounts in the year 1687 makes any analysis difficult. How did the CSO determine what to charge? Did location and difficulty with infrastructure construction and repair make any difference? Was it somewhat arbitrary with the amount chosen so that the numbers at the end matched between the fees and the expenses? None of this is clear in the CSO documents.

The CSO also charged users by land use. There was a special fee for irrigated gardens and for mills. These groups were often separated out from other users in the solicitation documents. For those with gardens, the fee would be by *pertica*, a unit of land measure of 762 sq meters. In a bill from 1710, the fee was 15 *lire* per *pertica* of irrigated garden, while in a tax document from 1715, the fee for an irrigated garden was 2 *lire* 16 *soldi* and 6 *denari*. A 1729 tax document was more specific and dealt also with days allotted for irrigation for a garden, an unusual reference to a *quindicena* type regime inside the city walls. The cost recorded was 1 *lira* 7 *soldi* and 6 *denari* per day allowed¹⁰⁴. The variation in fees in a close time period again brings confusion. Why was one group of garden owners charged 15 *lire* in 1710 and another group only 2 *lire* and change in 1715? Did location matter or the particular canal and the level of usage and strain on its infrastructure?

A third means of fee collection was based on a flat rate. This method was used twice with millers in 1703 and again in 1706. In 1703 the millers were charged 20 *lire* and 10 *soldi* per mill wheel. The price rose in 1706 to 26 *lire* and 15 *soldi* per wheel¹⁰⁵. As an infrequent charge, this might not have bothered an average miller in Piacenza. Their earnings may well have easily covered this expense or they could have passed the cost onto the customers. But it is to be noted that millers did occasionally plead poverty when

¹⁰³ In order of mention: CSO 13-F2-57, 15-F1-12, 15-F1-10, 6-LP-10 and 6-P1659-2, 18-F1714-1.

¹⁰⁴ In order of mention: CSO 18-F1709-37, 18_F1714-3, 6-P1701-23.

¹⁰⁵ CSO: 18-F1714-38, 18-F1714-39.

it came to fees to purge and clean canals, fees that were separate from these kinds of solicitation lists.

The CSO also charged per infrastructure. This could include ownership of a *bocche* or inlet in the canal, a *chiaviche*, or drain, as well as a sewage cistern, and the cesspit, *cesso*. That they charged for a *cesso* in these kinds of documents but not for every *pozzo immonditie* means that the *cesso* in particular might have been connected to the canal infrastructure. In a 1714 tax document clients paid 2 *soldi* and 6 *denari* per *braccio* of pipe, 12 *lire* for each *cesso*, 6 *lire* for a *chiavica*, and 10 *lire* per *pertica* for an irrigated garden. Clearly it is possible that some customers could end up with fees that included a drain/outlet, the *cesso*, and the length of the pipe from the waterway to the residence¹⁰⁶. Some residences, especially larger ones, would have included a garden as well. In this case, if fees were combined for types of use, then heavy users did pay more for water service. However, in these solicitation documents users tend to only have one fee listed after their name. The documents would have to be examined much more closely to see if names reoccurred within any single document indicating multiple fees were paid for separate water uses.

Finally, on rare occasions the CSO billed per *oncie*, or for the volume of water used. As noted this did not actually mean a charge for water used, as velocity could not be measured, and varied seasonally and with the level of maintenance to the pipes. Instead this was probably based on the diameter of the conduit the user had been awarded to construct by the CSO. A 1713 tax sheet billed according to ownership of *bochelli* (inlets to the house or institutions) with each *oncie* worth 10 *soldi*. Yet one of the inlets was designated as 11 *oncie* and charged 11 *lire*. A 1717 tax form also billed by *bochelli* and *oncie*¹⁰⁷. But this method appears rarely, with the length of pipe as the more usual means to determine what a user owed the city for water service.

Overall, it is really quite difficult to determine what a city resident paid for water over time. Some of the variation came in types of usage. Increased usage due to a garden or mill increased the fees. But for day labourers, the ones who made only 1 *lira* per day and

¹⁰⁶ CSO 18-F1714-1.

¹⁰⁷ CSO 18-F1714-37 and 18-F1714-46.

were generally renters, the real issue would have been the charge for linear measure of pipe. The religious institutions were the first builders of the canals and they determined where they would go. Convents and monasteries were well served by the system, often with a canal that ran through or alongside their gardens. Nobles, during the palace-building boom in the Farnese years, also often located their residences near the canals and thus minimized the actual distance for a connection to the waterway. The artisans in the southwest, canal-rich area of the city might have had fairly cheap water. But there is an area of the city where canals did not run and where connections may well have been costly if at all possible. That was the neighbourhood just north of San Lorenzo and east of the Palazzo Farnese, a lower income area, still today. Here, connections may have been much more expensive for many households, who might not have had the income to support water service in some years of the Farnese reign. Because the fees depended upon the ability to construct a conduit and then pay for it, lower-income families, distant from a waterway, may have had to do without. For them, water would have been too expensive. There is no record of public fountains in Piacenza. There are some references to *pozzo comune* (communal well) in the records, but once read in context, they always appear to refer to communal sewage and drainage cisterns, frequently located in the street to serve several households. The question of water provision for those who were poor or too distant from a canal remains open.



Figure 5-39: Demographics of wealth with canals. The light colour is the lowest income group. However, it must be noted that the map displays major waterways only. There were smaller channels to service specific institutions and residences that have not been mapped.

5.4. Management of pollution – penalties, zoning

Another means to regulate water use was to deal with pollution to the system and to penalize actions that created contamination. Certainly Italian cities acted against polluting activities early on in the development of their water systems. Kucher, in his work on medieval Siena, asserts that the point of the regulations was to maintain water purity, rulings that were supported by the actual design of the public fountains in that city. He explains the directives on some industries inside the city walls and some activities such as butchering meat. He also notes that the city government utilized custodians, guards and secret informers as well as city inspectors to insure the quality of the water supply¹⁰⁸. Zupko and Laures pick up on the theme of water management and pollution in their book

¹⁰⁸ Michael Kucher, 'The use of water and its regulation in medieval Siena', *Journal of Urban History*, 31 (2005): 504.

on urban environmental law in Medieval northern Italy. They observe that in the city of Ferrara, there was concern about the quality of the Po River, which led to the zoning of industries and pollution management for activities such as cleaning fish and treating flax¹⁰⁹.

In particular they go on to describe how local officials managed drainage of wastes in northern Italian cities.

Perhaps the most copious body of law in Italian city codes is related to the primary function of a system of sewers, drains, and ditches designed to accommodate ordinary runoff. Concerns expressed by statute makers were rather routine under the circumstances. Where systems were nonexistent or inadequate, the statutes authorized the construction of new systems. Existing drains, ditches, and sewers were to be cleaned of debris, repaired, or widened to insure the appropriate flowage through the ditches. The maintenance work ranged from the removal of refuse and plant matter to rather extensive repaving projects.¹¹⁰

This approach is borne out by the documents found in the CSO in Piacenza. Over and over again, the complaints focused on the need to purge and clean out the canals. One of the issues repeated frequently in the CSO orders was that of earth removal from the waterways. Orders and *gride* that concern clean-out of the water channels almost always specified that the earth was to be removed and how it was to be handled after removal. The removal of the silt from canals that were cleaned and of composted sewage from the cisterns was essential to keep the city inhabitants happy. The job of cleaning a canal or cistern was not considered done until the offending soil had been taken away and relocated outside the city walls. Primarily the CSO used orders of various levels, from general *gride* to specific orders to individuals, to manage the earth left from clean out operations. *Gride* almost always included language that acknowledged the soil to be lifted from the canals during a purge. Most frequently the soil was to be put into the street for removal. This may have been one of the reasons that time limits for canal maintenance were included in orders, with a penalty for tardy behaviour. If the CSO had to contract out for removal of the earth then they had to know when it would be ready for pick-up.

¹⁰⁹ Zupko and Laures, *Straws in the Wind*, 65. Note Ferrara is located on the lower end of the Po, downstream of many cities including Piacenza.

¹¹⁰ *Ibid.*, 67.

The orders were specific in terms of time limits and of the penalties for non-compliance, but not about the location to which the soil was to be transported. The CSO wanted any soil from any construction or clean up off the streets and would grant licenses to ensure compliance.

In only a few instances is it clear where soil was to be taken. On 20 November 1597 Giovanni Fonsanili requested a license from the CSO so that he could remove dirt from his basement to the kitchen garden of a monastery. In a letter possibly from 1623, a miller wrote that he had been prevented from compliance in the management of the soil removed from a canal due to the actions of others. The letter mentions that this dirt impeded service to the fortifications. But whether the soil was meant to enhance the large earth berm that served as part of the city ramparts or that some other service to the berm had been impeded by others' actions is unclear. In most cases the orders are not detailed about where the earth was to be taken, though in a *grida* from 1586 the miller who was to do the work was ordered to deposit the earth seventy *braccia* outside the city (about 33 meters). Generally earth and silt removed from water channels was to be put out into the public street and then transported away according to several *gride*¹¹¹.

The sewage removed from cisterns was handled differently. The policy appears to have been to do the work on cisterns, often located under streets, and for the soil to be removed at night. Around 1628 Francesco d'Assona wrote about a sewage cistern in his basement that desperately needed to be cleaned out because it smelled. He wanted a license to do the work at night. In the same time period there were several further requests for nocturnal removal of what was taken from household cisterns. Giovanni Antonio Campiani requested a license to clean out a household cistern at night. Likewise in separate letters to the CSO Giovanni Francisco Raggia and Antonio Bonadea made similar requests. And Bartolomeo Giorgi was granted a license to clean a cistern and remove the dirt at night.¹¹²

¹¹¹ In order of mention: CSO 2-F5-8, 8-F2-32, 2-F1-6, for *gride* that specify that silt from the canals should be put in the streets see 6-P1609-22, 12-F1-1 and 14-F1-10.

¹¹² CSO 9-F1-20, 8-F2-9, 8-F2-10, 8-F2-15, and 8-F2-14.

Such night time disturbances did elicit complaints. In 1647 Simone Gavibarelli wrote to complain about unknown people in the neighbourhood at night in connection with a cistern not cleaned for 20 years. And in a 1623 letter Antonio Francesco Montenari, a wall builder explained to the CSO that he had cleaned out a cistern with a number of companions. The fellow-workers were new to the job and did not know the orders for disposal of the dirt from the cistern. Consequently they had left piles of it all over town. He felt with this explanation he should have his deposit returned. Despite the clear disturbance this would have created amongst a population alert to such violations of urban decorum, there were no letters of complaint connected to this event¹¹³.

Montenari may have been contracted to do the work and brought a work crew with him, albeit, new men, unused to the conditions imposed upon the job. That contractors were used by the CSO for such jobs is shown in the bills they submitted with line items for removal of the soil they had excavated from the water channels. On 26 August, 1646 the Deputy for the CSO, Cristoforo Ferrari submitted a bill to be reimbursed for payment to a contractor and his workers involved in the purge of Rivo San Agostino. In the bill are two items that deal with earth disposal beyond the day rates for the laborers. Four *soldi* were charged for removal of earth outside of the convent of Santa Maria della Pace. The charge for removal of dirt in front of a house was included in the day rate¹¹⁴. The removal of soil excavated from water channels was included in the later tax documents as part of the description of the job to be covered by the collected fees. The taxes collected covered the costs of transporting dirt to the street where it was later picked up and removed¹¹⁵.

Beyond these kinds of regulations and orders, some cities did enact legislation to zone industries to prevent contamination of their water supply and to regulate the pollution of the waterways. The documents in the CSO do not explain any of these kinds of statutes if they existed in Piacenza. While certain industries appear to have been grouped together spatially, it is hard to know if this was the outcome of urban legislation or just the tendency for humans to group together when occupied with the same work. Of particular

¹¹³ CSO 11-F2-66 and 8-F2-44.

¹¹⁴ CSO 11-F2-5.

¹¹⁵ See CSO 18-F1709-37 for example.

concern would have been trades that involved organic wastes, such as the butchers and those involved with the marketing of fish, tanners, and textile production that involved flax and hemp. Wool also had to be washed in order to be processed. Zupko and Laures comment that cities sometimes required some polluting industries be located outside of city walls or on the extreme downstream end of the urban canals¹¹⁶.

5.4.1. Pollution and the Meat Market

In the CSO documents the most frequently mentioned source of industrial pollution is the meat market. In 1553 the meat market was relocated from the area of Piazza del Borgo to the centre, behind Piazza Grande, by the municipal government. There was a long and contentious relationship between the butchers and the governing officials, generally around the issue of fraud. In an effort to increase their power over the meat market that had been located near San Giorgio, the officials created a new facility behind the Gotico and across the street from San Donino, literally in the heart of the city. This then required the construction of the Rivo Meridiano to service the meat market and to effectively remove the waste to minimize disturbance to the local residents¹¹⁷. The new meat market and abattoir was complete by 1556 and a *grida* called for Rivo Meridiano to be purged and cleaned, so that it could better serve the facility. Another *grida* from 8 November 1601 directed the miller Rutilio Lodi to clean out Rivo Meridiano from the Beverora to the meat market every 15 days. This is an unusual directive for regular maintenance of one of the waterways. An order from 1602 called for a purge of Rivo Meridiano and noted that as it also served the meat market, the clean out would incur great costs¹¹⁸.

However, communications about the meat market were not one-sided. On 26 November 1613, the *Paratico de Macellari di Piacenza* (the butchers' guild) wrote a letter to the CSO. In it the spokesperson complained about the process of cleaning the Beverora and the expectations it placed upon the butchers. He requested a return of the deposit made against the expenses of canal maintenance. And on 12 April 1614, Antonio

¹¹⁶ Zupko and Laures, *Straws in the Wind* 100.

¹¹⁷ Zilocchi, *I Tormenti*, 29.

¹¹⁸ In order mentioned: CSO 1-P1555-8, 4-F4-3, 4-F4-1C.

Tayna wrote that he was not accountable for expenses incurred to clean out the canal that serviced the *beccarie*. He too wanted his pledge returned. In 1616 the Abbot of the monastery San Sisto wrote the CSO about the condition of the Beverora and mentioned that the *beccarie* needed to be cleaned due to evil odours. However as San Sisto is nowhere near the Rivo Meridiano, this may actually refer to the older San Giorgio location. Zilocchi contends that the move to the town centre was to centralize meat sales but it is unclear if the San Giorgio location had been closed down completely. On 8 June 1617 the CSO gave an order to Rutilio di Lodi to fix the inlet into the Rivo delle Beccarie and again to conduct twice-monthly cleaning of the Beverora and the Rivo for the meat market. This order caused unhappiness to some, as on 23 October 1617, the *Paratico dello Becharie* wrote to inform the CSO that the *Consoli* and the *Paratico del Università de Macellari* were not content with the tax to clean Rivo Meridiano, which served the *beccarie*. He mentioned work already done and declared that the pollution in the Rivo was put into the street after the Rivo had run through the meat market¹¹⁹.

A small packet of documents located in the *Acqua di Trebbia* archive give a short history of the meat market and the efforts of city officials to keep the city free of contamination. It traces various cases and orders that sought to keep Rivo Meridiano clean and flowing. The city drew up the agreement to have Rivo Meridiano and parts of the Beverora cleaned every 15 days in order to control the pollution¹²⁰. In 1630 Antonio Villani, a tenant in the garden of the duke at San Lorenzo, wrote to complain of all the waste from the meat market in Rivo Meridiano and the *gran fittore* (fedor) caused by the waste. He requested a clean-out and indeed, in a note on the front of the letter, the CSO official responded that it should issue a *grida* to purge the Rivo and remove the waste and earth from the channel¹²¹.

In 1643 the *Paratico* of the *beccari* once again wrote the CSO. He complained that Domenechino Barrocliero had caused an impediment to the removal of the material of the meat market and made it impossible to clean the area. He wanted his pledge returned. On 31 March 1664 there was an order issued to purge the Rivo and clean the *beccarie* on the

¹¹⁹ In order mentioned: CSO 7-F1-33, 7-F1-35, 7-F1-51, 7-F2-4, 7-F2-3.

¹²⁰ AT8-F1-19.

¹²¹ CSO 9-F2-55.

request of the dowager duchess. This obviously had to do with her extreme downstream position along Rivo Meridiano, which made her garden the recipient of organic wastes from the meat market. A letter from 1666 complained about the mess left by the beasts that were slaughtered in the meat market. It left a smelly mess in the area around San Donino according to writer Margarita Passoni. In 1668 an order went from the CSO to the *Paratico del Beccarie* that called for repairs to the infrastructure around the menagerie of the meat market. It seems that Signora Passoni's earlier complaint had some merit. Another order from 1669 that dealt with sewers and cisterns also mentioned that large amounts of manure had been allowed to accumulate in the streets of the meat market¹²².

An order from 23 May 1678 involved the damaged infrastructure of Rivo Meridiano, especially near the Duomo, down the hill from the meat market. The cattle led to the abattoir were mentioned specially. Repairs were called for, and the members of the market undersigned the order¹²³. On 26 October 1686, officials of the *beccarie* came together to protest an order by the CSO. At issue was the road behind the market, and the public road for the church of San Donino that gives out onto the Piazza Grande. Sig Antonio Franchi Colombi, a specialist in medical matters, had a shop there that looked out over this street. Also mentioned are the rector of San Ilario and other officials. Poor Sig Colombi had a house that opened into a small street right next to the gate into the menagerie for the meat market. An opening in the wall was causing distress. The officials of the abattoir had been ordered to clean up the gross and sordid materials and to purge the inlet of the fetid waste twice a week and in other seasons, three times a week. Failure to do so would result in a fine of 25 gold *scudi* to the *Paratico* of the *Macellari*. Orders from 14 March and 14 July 1687 addressed the same issues, including the holding pens for animals with a similar penalty¹²⁴.

This sequence shows that the meat market was an ongoing concern. Animals in a dense urban settlement make a mess. They create their own sewage as living animals and more organic waste after being butchered. The presence of holding pens, a space designed to

¹²² In order mentioned: CSO 14-F2-42, AT8-F1-17, 13-F2-15, 13-F2-27, 13-F2-30.

¹²³ CSO 13-F2-87.

¹²⁴ In order mentioned: CSO 15-F1-23, 15-F2-57, 15-F1-25.

slaughter the animals and sell the meat in the centre of town, at one of the most important communal sites, created difficulties for the city officials. Yet the option to relocate appears not to have been discussed. The meat market had been moved to give urban officials more oversight of fraud in the meat industry and they were intent on maintaining the new location as the official meat market. Instead the officials sought to create sufficient regulations and enforce them through penalties to mitigate the complaints about bad odors and organic waste. In doing so the CSO found itself in conflict with the officials of the meat market, who did not want to spend extra money to manage the waterway or the holding areas. Ironically, one of the persons to suffer most from the organic waste in Rivo Meridiano would have been the Duchess in her garden at San Lorenzo and Palazzo Madama. The refusal of the city officials to move the meat market away from the centre of the city meant that the problems with waste and bad smells were unresolved. Zilocchi does note that later in the 17th century shops outside of the heavily governed meat market began to be allowed to sell meat, often specific and limited cuts. This began the process of decentralizing the location of meat processing in the city¹²⁵.

Most cities also had fish markets in specified locations. Piacenza's fish market was located next to the Gotico and the Piazza Grande. It too would have been in a position to use Rivo Meridiano. However, there is little mention of this market in the archival documents. Perhaps the problems with the nearby meat market overwhelmed all other sources of olfactory dissatisfaction.

One other specific complaint about bad smells had to do with the process of tanning leather. Antonio Gerla wrote in 1690 about problems in Cantone Lecardi and how the smells had damaged the church and nearby neighbourhood. The smells came from a house where someone was engaged in tanning. After writing three pages to elaborate his complaint, Sig Gerla asked that the committee members come to see the truth of the matter and that grave damage had been done by allowing this work to be done in a house¹²⁶.

¹²⁵ Zilocchi, *I Tormenti*, 43-44.

¹²⁶ CSO 17-F1690-26.

5.4.2. Penalties and Fines

The final cost to utility customers came in the form of pledges and penalties for failure to comply with CSO orders. These orders often had to do with a failure to purge and clean out a canal and to dispose of the sludge and silt properly. An examination of *gride* issued for the whole of the city shows a range in the highest penalties from a low of 5 *scudi* of gold to a peak of 25 *scudi* of gold for disobedience to CSO orders with a single anomaly of 100 *scudi*. There appears to be no real systemic organization to the maximum penalty amounts nor is there a discernible trend upwards over the 200 year period.

Gride maximum penalty amounts in gold *scudi*:

1557	25 <i>scudi</i>
1606	25 <i>scudi</i>
1636	100 <i>scudi</i>
1639	10 <i>scudi</i>
1640	10 <i>scudi</i>
1649	25 <i>scudi</i>
1657	25 <i>scudi</i>
1660	10 <i>scudi</i>
1663	5 and 10 <i>scudi</i>
1671	10 and 25 <i>scudi</i>
1682	10 <i>scudi</i>

In 1606, 1648, 1650, and 1670 notice was given that the penalty was not redeemable. This was perhaps a response to the regular requests that arrived at the CSO for refunds of penalties given that the required work had been completed. And, perhaps to encourage reports of malfeasance a *grida* from 1606 declared that it would keep secret those who made reports and accusations. Two other *gride* promised additional unnamed, to-be-determined punishments beyond the cost of the fine¹²⁷.

¹²⁷ CSO in order of mention: 1-P1554-5, 13-F1-1, 10-F2-19, 14-F1-10, 14-F1-35, 12-F1-2, 12-F2-58, 13-F1-14, 13-F1-39, 13-F2-31, 13-F2-42, 15-F1-22. Those that claim non-

A more nuanced view of the fines can be seen in the varied orders given out by the CSO, often to individuals or specific groups. These fines range from a low of 1 or 2 *scudi* of gold to a singular threat of 500 *scudi* of gold. This fine was the warning made to two individuals ordered to clear out the dirt from outside of a canal in front of the Monastery of San Gerolamo in 1644. The other large penalty is in an order from August 1646 to Sig Lorenzo Rubino, who had 8 days to clean out and purge the Rivo San Agostino that fed a mill and to remove the dirt. Failure to do so would have cost Sig Rubino 200 *scudi* of gold¹²⁸. But like the *gride* the normal fine was much lower and consistent over the course of the 200 years.

redeemable penalties are: 12-F1-1, 12-F1-16, 12-f1-28, 13-F1-1, 13-F2-40. 13-F1-2 offers to protect accusers. And 13-F1-1 and 13-F1-14 offer additional punishments to be determined.

¹²⁸ The order that names the 500 *scudi* fine is CSO 11-F1-24, the 200 *scudi* fine is found in 11-F2-17. The order that involved the 200 *scudi* fine also mentions Sig Cattaneo.

Penalties in CSO orders per decade, in scudi

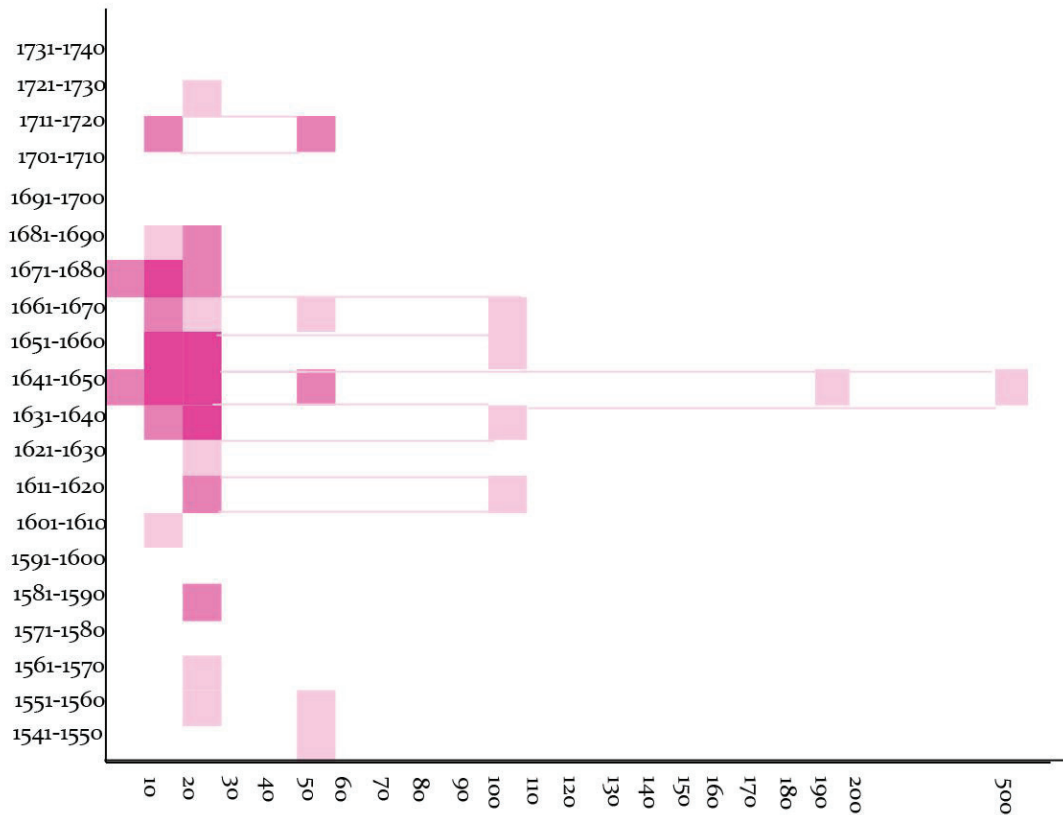


Figure 5-40: Penalties in CSO orders, per decade. Light pink = 1 incident per decade, medium pink is 2-3 incidents per decade, dark pink is 4 or more incidents per decade. This does not show what fines were actually paid.

Like many Italian cities of the time, the issue of foul odours was continual and distressing to the residents. They complained, sometimes repeatedly. The difficulty was how to manage the waste and yet maintain the services residents expected, such as an easily accessible, regulated meat market. Without refrigeration organic wastes could only be managed through removal from the site, which made the flow of the canals essential to the well-being of the city. Thus canal purging and cleaning was a primary activity for the CSO over the period.

5.5 Summary

The different occupations and people involved with the system shaped it and the city on a day-to-day basis. The ecclesiastical institutions first built the canals, primarily to service fields that surrounded the city and their own mills. The urban population as a whole paid for extensions and upgrades to the system through their taxes. But the people who really shaped the system and the city were the *consorti*. The myriad *consorti* got the infrastructure built and supervised it over a long period of time, through the 19th century. For about 700 years these associations of local people made and managed this water system in a variety of ways.

Each of these groups, along with individual householders had to get along for the system to function. It functioned on trust, trust that the amounts of water would be adequate, and trust that those with power would choose to manage the locks and gates correctly and with an eye towards their neighbours' needs. But such trust can break down easily, especially in times of resource scarcity or other economic stress. Beyond legal cases, water and other resource management can also utilize pricing regimes, specialist expertise, and penalties as mechanisms to determine water rights, reward right use of water, and punish wrong uses that break trust and threaten the viability of the system.

In light of the length of time involved and the complexity and difficulties inherent in the design of this system, what stands out is the lack of major conflict. The CSO, a committee made up largely of nobles, could not have made the system work apart from the multitude of associations and others committed to the various canals and pieces of infrastructure. This system, sustained through political upheavals, wars, plague and famine, is an example of long-term private/public partnerships that, for the most part, kept the mills going and allowed the sewage to find its way outside the city walls. Together, across institutional, political and class lines, the inhabitants of Piacenza and its countryside created a landscape ecology, patterns of land use, that built upon Roman interventions and determined the way the city functioned spatially and socially.

CHAPTER 6: CONCLUSION

6.1 THE MEANING OF HISTORICAL RESEARCH INTO POLITICAL ECOLOGY

Political ecology as a discipline lies at the intersection of the environmental context, land use, spatial design, demographics and social relationships. It takes the discipline of landscape ecology and adds more of the human dimension with examinations of human behaviours¹. This thesis has investigated the political ecology of an Early Modern city through an analysis of the water system management. What further research is yet needed on Piacenza to round out the examination of the CSO archives? What have we learned from this investigation? Can any of it be applied to situations we face today with water management?

6.1.1 What the archives have shown us

The documents of the CSO have provided a new understanding of a critical aspect of life in Early Modern Piacenza. While other northern Italian urban water utilities have been studied, none have gone into the records of the small transactions that keep a system going from day-to-day. These documents take the investigation beyond municipal statutes and regulations, occasional decrees, and lists of professional engineers and water managers, to illuminate the ordinary aspects of an early modern water service. In the archive it can be seen the concerns and complaints of residents followed by committee responses, sometimes in sequence that went on for years. Water determined the industrial development of the city as well as the health of its residents, and this record opens up a whole new realm of social relations for a city of Piacenza at that time. Water management involved everyone in the urban space: ecclesiastical institutions, the nobility, merchants and markets, and ordinary residents, and these documents provide data on urban land uses, the social relations between the classes, and economic

¹ The Center for Political Ecology defines it as an exploration of the relationships between economic activity, politics, culture, human rights and the environment. For more see <http://www.centerforpoliticalecology.org/>. The EU network for political ecology does research under five thematic areas: environmental conflicts; environmental movements; natural disasters; the commons; and environmental justice and democracy. For more see <http://www.politicalecology.eu/>

demographics of the city. The importance of water also means that this research adds to a growing knowledge of the political ecology of early modern Italian city states. The CSO archives, along with other archival resources, demonstrate the management approach to the landscape inside and outside of the city walls as the canals conducted the Trebbia water into the city.

6.1.2 Further research in Piacenza

The documents themselves are only one part of the story of water management in Piacenza; they continue to leave many questions unresolved.

1. What about drinking water? The CSO documents offered little evidence for how the residents quenched their thirst. Was it through private, unregulated wells that were already established by the time the committee came into being? If cisterns for drainage and sewage were regulated and had to be licensed, why not wells for sweet or clean water? The relationship between potable water and sanitation in the canal system remains unclear. Further research into notarial documents concerned with house sales, or wills and testament inventories, all of which would list fountains or wells as a property asset, may answer this question.

2. The role of the *consorti* needs to be investigated through alternative sources, especially legal documents. How were these associations formed? Could membership be inherited or alternatively could it be refused if inherited? What was the legal standing of a consortium? Were there different types of *consorti*, and if so, how did they differ? What were the rights and responsibilities of the *consorti*? Were there differences between associations in the city and in the countryside? How were new associations formed, under what legal constraints and at whose initiative? These vital social organizations, the real backbone of the water utility, remain obscure. Further research into notarial archives would help explain the private/public partnerships that allowed the system to function.

3. While other cities have been investigated for their water management and pollution regulations, Piacenza has not. Research into the statutes and how they were implemented would help, especially on the issue of pollution and sewage in the canals. How were polluting industries organized and supervised? Some of this information may

be available in guild records and early municipal statutes. It may also be in later records that dealt with sanitation particularly after the cholera plague of the 1830's.

4. While the general origin of the canals is clear, information is lacking on individual canals. Research into church records may add to this knowledge and enable a more detailed understanding of each canal, its origins and early management. Certainly Cademartiri has done some of this work on Rivo San Savino but more is needed. And the Fodesta, the only navigable canal, remains a mystery. Investigation into church records for San Sisto, who controlled the port, may increase knowledge of that canal.

5. One of the most difficult discussions in this thesis was the one on canal dimensions. It remains unclear how deep and wide these canals really were due to the murkiness of the units used and the limitations of early maps. The actual dimensions of the canals are critical to comprehend the impact on the space of the city. Work in Bologna has shown canals that were quite wide, more so than anything known in Piacenza at this point. Carlo Salomoni puts the Navile Channel, originally called the Canale di Reno, at 11 meters wide with a depth of 3.2 meters². This depth would be the same as 6 *piacentine* braccia, a depth often indicated on the canal profiles. Since the canals in Piacenza have long since disappeared and have been subject to ongoing modern urban development and redevelopment, a reconstruction of a canal like that in Bologna is impossible. We are then forced to rely on the maps but an examination of earlier documents that detail the actual construction of the canals, especially the ecclesiastical canals may help. Another possible source of information would be additional documents on the development of Rivo Meridiano. It was last major canal, constructed during the 1550's, but information on it was sparse in the CSO documents. It is possible that the documents that pertain to the construction and the dimensions of the canal are located in elsewhere.

² Carlo Salomoni , "The Navile Channel", [Aqua Press International](http://www.aquamedia.at/The-Navile-Channel.2808.0.html), <<http://www.aquamedia.at/The-Navile-Channel.2808.0.html>> .

6. Another difficult area was the exploration into the cost of water services. It is yet unresolved how much a household or person would pay for the utility on an annual basis though notarial documents may give more information. The role of the deposits and the amount of funds the committee had available for infrastructure work has yet to be computed.

7. This research examined the CSO in isolation to other committees in the governance structure. It did not address important questions about sanitation especially in times of plague. This would require further study of other governance structures to understand how the CSO fit in and worked within the whole of the Farnese administration. Water was too critical for the CSO to be an isolated unit of administration. The connections are there but need to be investigated further.

8. The legal documents in the CSO require more research. Many were damaged and remain difficult to impossible to read, especially within the time constraints of this research. But they require another look to understand the place of legal suits and criminal cases in the management of the canal and water system.

Finally, one of the fruits of this research is a detailed Excel file of CSO busta 1-19 and all the documents that pertained, even remotely, to water management. The information has been assembled by canal in one file and by year in decades in another file. This is a new digital index that will be made available to the Archivio di Stato di Piacenza. My hope is that others will add to the information in the files, and correct my mistakes, so that this can become a complete and detailed index to the archive.

6.2 WATER MANAGEMENT - LESSONS LEARNED

In his advocacy for early human origins to be included in the study of history, Daniel Smal extends the idea of historical research from that of biographies or descriptions of events to also incorporate the “study of structures and patterns that shape human experience”³. If the latter is included in historical investigation, then the actions of our

³ Daniel Smal, “In the Grip of Sacred History”, The American Historical Review (Dec 2005:vol. 110, # 5): 1337-8.

ancestors gain meaning beyond particular events. The collective behaviour and choices made by those who came before us can be studied to reveal information on how humans have made decisions within the constraints of their ecological contexts over the course of time. It also points to the possibility that examinations of human behaviour in other disciplines such as evolutionary biology, anthropology, and environmental psychology can contribute to our understanding of historically studied events. While human culture evolves constantly, and often today at lightning speed, core human behaviours and attitudes evolve much more slowly. In this way research into historical events can enhance knowledge needed to deal with contemporary issues.

While analysis of the historical documents has been the basis of this research, the underlying foundation of the study is that of landscape ecology with the addition of social and political elements and an understanding of evolved human behaviour. This method has attempted to develop a political ecology for Piacenza by connecting the actions of the humans involved to the ecology of the urban environment and the urban morphology. This means more than the green spaces; it includes the environment as a context, as the ecosystem in which people lived out their lives and daily activities within a particular spatial, human-constructed arrangement. It also acknowledges the connections between the water used in the city and in the countryside, with its particular hydrological needs, and the human-developed system of water channels.

According to Field et al., landscape ecology studies landscape patterns and processes at varied scales. These scales affect the flow of materials, species and energy in the system, influence the ability of the landscape to act as a habitat for humans, and makes or restricts access to natural resources⁴. In the case of Piacenza the material flow for this research was the Trebbia River water that was deliberately diverted to hydrate the surrounding landscape, including the urban arrangement, before it entered the Po River. As such, this water flow created a new ecological context based on agriculture and industrial processes in the area. To compensate for the lack of social analysis in many studies in landscape ecology Field et al. add demographic materials to the research methodology. This

⁴ Donald R. Field, Paul Voss, Tracy Kuczenski, Roger Hammer, and Volker Radeloff, "Reaffirming Social Landscape Analysis in Landscape Ecology: A Conceptual Framework", *Society and Natural Resources: an International Journal*, 16:4, (2003):351.

approach refuses to separate humans from other species in the ecosystem as somehow apart and different. Human culture as human activity, such as the Roman approach to agricultural landscapes, creates new ecological realities that affect all of the species within an ecosystem⁵. For this project, located in an urban habitat, the spatial analysis utilized demographics, and social and political activities, as well as land use patterns.

This investigation has focused on human behaviour within an urban configuration. The city has emerged as a focal point of much research in recent years because the world is now 50% urbanized, with more people living in cities than ever before. Understanding how cities emerge and develop, provide essential services, and make the difficult decisions required to manage resources has become a critical challenge. The real difference between cities today and yesterday are the technologies available, how they smooth out or increase social differences, and the scales they enable for human habitations, but human behaviour has not really changed. Because of the drive towards global urbanization, the political ecology of cities has to be understood. Cities, as human constructs that reflect human behaviours and then influence them, tend to have certain characteristics and that is true, despite building styles or materials, fashionable planning designs, specific means of transportation, or demographic scales. If human beings are viewed as the dominant species in the urban habitat, then it is these kinds of spaces that merit special attention. In this project the water network allowed the development of varied land uses, generated wealth, the prospect of making and trading value-added products, and created patterns and processes within the urban landscape of Piacenza. As decisions were made, through conflict or cooperation, to expand or alter the water system, the urban morphology and ecology was transformed by social behaviours which then had to respond to the changed ecosystem and spatial dynamics. This type of process continues within cities today, no matter what their size or scale.

As a means to understand the water system of a city this research is inadequate to the task, it is a beginning rather than an end. It raises numerous questions about Piacenza itself, the geographical, political and economic contexts of different temporal periods. And it questions the larger historical and geographical context of northern Italy as water

⁵ Ibid., see page 356.

systems were developed and managed by the various cities. The archival documents used in this research illuminate a limited aspect of the management of the water resources of Piacenza. However, the documents investigated provide yet another link in the longer history of human interventions into this landscape and the results for the urban politics, economics and daily life.

6.2.1 ISSUES THAT ARISE FROM THE RESEARCH

Private/public partnerships – scale and politics

Whoever gains control of a vital resource like water also gains immense social and political power. As the cities of northern Italy evolved, church officials, feudal lords, and urban authorities engaged in power struggles for control of vital resources like water. During the late Middle Ages, the cities of northern Italy had to deal with factionalized urban governance that sought resolution through legislation, strongly regulated elections, and urban spatial divisions. Governments exist, at least partially, to solve problems. Ultimately for many cities, the final choice and or perhaps the logical result was a single leader and absolutist rule. Urban administration models shifted and altered, but the issue of water provision remained for early modern northern Italian cities.

During the Middle Ages, the hodgepodge of feudal territories mixed with sites under ecclesiastical control and emerging Communal governments, with the limitations of available technology, forced decentralized decision-making upon those who needed to manage urban water systems like that of Piacenza. Cooperation across social classes and professional capacities became a normal feature for the utility. This cooperation is most striking in the formation and maintenance of the rural and urban consortia that owned or leased sections of the service. These private/public partnerships allowed the water system to function as no single political entity had the power and resources to create and manage the large and complex system

The lesson from Piacenza about private/public partnerships is one of scale. The patchwork of water rights for Piacenza and its countryside were determined at the local, regional and territorial levels. According to Rangan and Kull, political ecology describes how economic and political processes and networks operating at those various scales

interact to create ecological results in particular places⁶. The political ecology of Piacenza's water system evolved through grants by an assortment of imperial agents that initially include Romans for the first canals, regional dukes in Milan, the Pope and ecclesiastical institutions, and the city itself to local users. These rights, granted through political entities at different scales, created a nested and complex relational interaction that allowed, or sometimes inhibited, the developing water network. The combination of the water infrastructure as a material that required local canal and ditch management, and the power to grant control of parts of the system created the varied scales within the organization. Political scale is something that is socially produced and shifts over time. Piacenza built its water system in times of strong local political control but also in times where the local was overtaken and ruled by larger forces that operated at regional, territorial or trans-territorial political scales. This variation in scale makes analysis of such a system difficult. Which scale is the proper starting point to understand and explain the system? In this research the local or municipal scale became the primary focus simply due to the archival documents that were used. But certainly the other, larger scale, political forces were significant from the original grants by imperial agents and Popes to the power struggle between the Landi and the Farnese dukes.

Rangan and Kull propose three ways to understand scale in a system based on the works of Lefebvre and Braudel, that is, operational, observational, and interpretive. Operational scale is the combination of time, space and power and it shapes both the social activity and the physical reality of a space, it is really the kind of long term material life and practices that shape a place. In the case of Piacenza, the *consorti* and the millers who handled the system and made it work were the social shapers of the space and the infrastructure. Observational scale comes from measurement and control over the system. It involves policy and rules over the physical infrastructure and the behaviours of users. This describes the power of the CSO and the professional engineers hired by the city to oversee and manage the system. But at another political scale it also describes the ducal-appointed *Referendario* and the Water Commissioner who dealt with the water utility on a more territorial level that included the rural water use. The third type,

⁶ Haripriya Rangan and Christian Kull, "What makes ecology 'political'?": rethinking 'scale' in political ecology, *Progress in Human Geography* 33(2009): 30.

Interpretive scale, has to do with how the system is explained, generalized and simplified, in order to create a context of understanding. This aspect is less clear in the documents of the CSO except perhaps in the orders and *gride* that summoned all inhabitants in the city to contribute to the beauty and decorum of the city through the proper maintenance of the system⁷.

Piacenza as an early *Comune* struggled with the reality of a disunity of scales, and sought to resolve it through control over the water system that came from the countryside in order to manage the urban water flow. The consortia, as primary system operators, worked well when they were small and local in scale, and legally under the control of the city government. As a social system to manage physical infrastructure, the consortia actually worked for over 700 years. The problems developed when the observational scale was separated from the operational scale, that is, when politics allowed the Landi family to control the system. At that point the persons in charge of the water flow at the Trebbia were operating at a regional political scale and in opposition, due to their own interests, to the local operations of the system. This situation was only resolved when the Farnese duke finally removed all power from the Landi and gave most of it over to the city, so that then, for the most part, operational and observational scales aligned politically. There were still some struggles with the duke until the city officials won their way and local people were appointed as the Commissioners for the water system. The system in Piacenza did however function under the authority of the ducal representative, the governor, who himself was not a local person. He was a chosen outsider meant to bring a measure of neutrality to the situation and to keep the interests of the duke paramount in local decision-making. When the Landi were removed from regional power over the canals at the Trebbia, the various scales of the system came into balance and alignment with one another.

This episode in the history of Piacenza points to the possibility that private/public partnerships work well when the various types of scales are aligned and when those involved at different levels of authority have the same goals. When a large, private entity (including powerful families) takes over a municipal water system the scales can go out

⁷ *Ibid.*, 38-40.

of alignment. Operationally, the system might work at a local level, while the observational power or the control would be vested in a national or trans-national level with the goal of wealth creation for its members. This can create disunity between the scales of the system with discord between users, local operators, and non-local owners, all with different goals for the system. As long as the scales are aligned, decentralized or shared and partnered systems may be possible.

The other lesson from Piacenza is that utilities that are city-owned or public in nature cannot be in competition for power over the system with a private entity. The Landi family was big enough and connected enough, especially in the 15th century, to challenge the city for power over the water system. For the system to operate well the private consortia had to be firmly under the legal rule of the public utility so that they could be coerced when necessary for the good of the whole system. The local consortia had to be managed with a local political structure. This too would argue against public/private partnerships with mismatched scales.

Knowledge and intimacy with system by users

While the system of decentralized ownership and maintenance in Piacenza required extensive monitoring of rights and responsibilities, it also kept a larger number of people involved and active in the day to day management of the structure. It kept knowledge of the arrangement and how to run it dispersed among many people in the community. This is quite different from developed cities today where only a few experts understand and administer the water systems. One of the things that came through over and over again in the letters written to the CSO was the level of knowledge of the water network among users. Non-specialist users could refer to infrastructure parts by name and knew their functions and locations. They could trace the system and explain where failures had occurred. Sometimes, in reading the documents, it seemed that everyone in the city knew the system, understood the requirements and dynamics of the infrastructure, and participated in its management. This was possible and even required because technologically the system in Piacenza was quite simple but required complex social arrangements to work. Contemporary systems tend to be socially simple but

technologically complex and require a large number of highly trained people to manage them.

Thus today this intimate knowledge has been lost by the greater population. A few specialists design and manage the infrastructure and the ordinary user has little or no understanding of how the water gets to their home or how the sewage is removed and treated. This has created a disconnection between users of the natural resource and the realities of the resource itself. When climate change and population pressures change the availability of water resources this kind of knowledge will have to be reclaimed without necessarily allowing for the risks of decentralized management.

The inhabitants of Piacenza understood their system. They knew when it malfunctioned and often, the reasons for service interruptions. They understood the maintenance requirements of the infrastructure even if they were sometimes sluggish in response to the orders to effect repairs. Taxes and fees were directed at specific users and particular parts of the system rather than a general whole with face to face interactions as monies were collected. This created a level of intimacy between users and resource that has been lost as the system went underground, out of view, and was managed by professionals.

Social management of resource

The people who oversaw the Piacentine water system had to deal with a problem common to human societies, that of the free-loader or cheater. Cheaters are those who gain benefits from the organization yet withhold their own contribution, or actively obstruct the arrangement. If left unchecked cheaters can bring down cooperative systems. The Piacenza water service depended upon the good will of all involved and administrators had to find a means to manage those who acted in bad faith.

The administration in Piacenza had to deal with several types of cheating. The irrigation regime that limited water use to certain times could be abused with locks left opened in the wrong times. Water theft was a crime that could be prosecuted by the criminal tribunal. But people could steal in other ways; they could choose not to respond to a call to clean up their portion of the canal, or to clean out a sewage cistern. The

millers, as contractors could do a poor job on the canal maintenance, or simply not get it done. The masons could use shoddy materials in the construction of the banks of the canals. All of these actions would have impeded cooperation and if allowed to go unchecked, would bring the system to a halt.

The prime example of corruption, from the viewpoint of the urban administration, was Count Landi who controlled the water in the late 15th century at its access point at the Trebbia River. When he refused sufficient water to the city he was perceived to be cheating though he may have had good reasons for his actions. The response of the *Comune* government was to appeal to higher authorities who then penalized the Landi cheating with the removal of power over the system and reforms to the organization.

The CSO handled cheaters through the use of penalties and fines, fees that could be refunded for work done and legal suits. Information to normalize cooperation and clarify penalties came through the decrees and orders published by the committee. In each decree all inhabitants, regardless of class or station were called upon to do the work. This, at least in theory, equalized cooperation and made it fair. And clear penalties were stated for non-compliance. The language the CSO used in its various orders and decrees premised universal cooperation and made clear to all the cost of cheating. It promoted a sense of fairness and that all were accountable for the collective utility.

Relationship of resource flow to space of city and the formation of urban ecologies

Resource flows shape cities and the urban political economy. The water flow in Piacenza literally created a flow of wealth through the city. As the city expanded the location of mills and other water dependent industries, ecclesiastical institutions, noble palaces, and gardens were determined by canal locations. The water flow itself was dependent upon the topography of the site that gave the city a relationship to the shape of the ground it sat on. The course of water through the city in human-made channels determined production facility locations, the sites of green spaces, gardens, and sanitation facilities, and set the spatial demographics of the city. People lived and worked in the city, often according to the location of the canals. The canals regulated how people

moved through the city, over the various bridges, and alongside channels of water. The canals determined the pattern of land-use and the urban ecology of Piacenza. The canals also determined the experience of everyday life for the inhabitants of the city.

Patterns of use determine what species are present on different sites due to availability of water. A site used for food production will also host small rodents, birds and insects that might be absent from harder surface spaces in a city. Likewise the presence of water, especially if the banks are soft-sided, allows for wild and weed species to populate an area that would not otherwise have sufficient water in other urban locations. The CSO documents provide little insight into these particular issues aside from the designation of varied land uses under the different water regimes. But as climate change increases pressure on human habitations, the issue of water location and flows, the allowance of urban agriculture, or colonization by non-cultivated species and wild-life become more urgent. Decisions as simple as no-mow zones or the promotion of rain gardens along roadways to enhance water retention are an acknowledgement of the impact of resource flows in the urban space and the various ecologies that these flows can sustain.

The people in Piacenza did not always manage their water well. They lacked important knowledge of water velocity and therefore made choices based on incomplete information. But they continually had to react to the real dynamics of the ecosystem in which they were located, whether the water ran high or low, or how much was available and then who got it. Their responses and the social management of the resource may well provide us with important lessons for our own tomorrows.

The creation of urban resiliency

With the onset of more extreme weather conditions and the anticipation of increases in sea level, coupled with the continued rise in global urban populations, many city planners now aim for resiliency rather than sustainability. The term sustainability has been widely used and generally denotes economic and ecological practices that do little harm to the environment and can therefore be utilized for a long time. The term resiliency recognizes that in light of predicted climate shifts, sustainability is not enough to protect urban populations from extreme weather events in their own city, or from the effects of such

events in other parts of the world. Resilience planning was initially a form of disaster preparation for cases like tornados, hurricanes, earthquakes and other events that can destroy the infrastructure upon which urban life depends. Now, however, there is a recognition that resiliency is needed to meet new needs like extreme heat waves, superstorms, and droughts that not only stress urban population health but might make food, water, and energy supplies scarce. Some planners have turned their attention to these issues and the conditions required to prevent or adapt to them⁸.

Italian cities sought their own form of resilience in their water systems. One of the best examples is Siena with the redundancy of the tunnel and fountain complexes, combined with roof-top collection and where possible, wells. Due to the technological inability to overcome the dynamic fluctuations of their ecologies, especially with summer dry spells, many cities layered systems one upon another so that the urban population would not go completely without water resources. Piacenza may have felt less compulsion to duplicate services due to the proximity of the Po River. There was always water available if one was willing to haul it, though it could not power the land-based mills. But even then, there were floating mills on the Po River that provided at least some redundancy of infrastructure. Today's centralized urban water systems lack that redundancy. If the power is cut then the pumps grind to a halt and the water supply is threatened. There is no back-up system, except for the bottled water imported in disaster situations. Adopting resilience in today's cities means learning to think like our ancestors, including those who had charge of urban water systems for 1000 years or more in northern Italy.

⁸ For example, research themes at the Stockholm Resilience Centre include: water, food and ecosystem services, global and cross-scale dynamics, adaptive governance, regime shifts, and urban social-ecological systems among others. <http://www.stockholmresilience.org/research/researchthemes.4.aeea46911a3127427980006208.html>> While the UN Office for Disaster Risk Reduction (UNISDR) has partnered with cities and governments to increase urban resilience and has used the International Institute for Environment and Development (iied) in London to produce new materials on urbanization and resilience. For more see: <http://www.iied.org/>>and <http://www.unisdr.org/>>

6.3 SUMMARY AND CONCLUSION

Terje Tvedt, a professor at the University of Bergen, Norway, contends that all societies have been shaped by the struggle to control water. Control of water resources within settlements is a source of social and spatial power inside every human community, and as Tvedt points out, competition over this finite resource is nothing new, especially as every society needs water⁹. Over the long term the people of Piacenza, despite class and factional differences, had to accommodate one another to ensure that water was delivered to the city, sanitation needs were met, crops could be grown, and industry could flourish with the energy it required. Despite technological short-comings and political struggles the city achieved this goal, for the most part, over a long period of time. To do so they had to develop and implement methods that addressed the technical needs of water management but also the social and political structures that ensured the water continued to flow. In the face of many difficulties they created an administration that was able to promote cooperation and penalized the cheaters and free-loaders. In doing so they created an urban political ecology that allowed for food production as well as industrial facilities and mills. The many water channels that fed the city from the Trebbia River resulted in a particular kind of city space, a space that is difficult to envision today as the water channels disappeared. This kind of cooperative social and spatial arrangement, successful for so long, is one example of how an urban administration can manage an urban resource flow.

Today, as cities confront various challenges, from population growth to resource scarcity, we need to better understand how human beings create and manage the systems to share resources. How is cooperation in these organizations enhanced? What is considered fair and how is the structure designed to promote such fairness? What is the impact of context on our organized systems? Do we shift our management approach during times of scarcity versus times of surplus? How do we decrease the time it takes for

⁹ Terje Tvedt is President of the International Water History Association, Professor, Dept of Geography, University of Bergen, Adjunct Prof, University of Oslo. Quote from video: A Journey into the History of Water, TVEDT 2001, produced by Norwegian Broadcasting with University of Bergen. <<http://watervideo.com/video.htm>>.

us to respond to a changed context? What is the difference between the human right to water access and resources that are privately owned and must be paid for in other ways? How do we intend to manage water for the collective whole in times of scarcity?

And as we rethink these issues we need also to reflect upon urban space and its relationship to water. How do we design our cities spatially to relate better to water resources and local watersheds so that urban populations may be more connected to and more knowledgeable about their resource usage? Already design changes have been implemented in some cities to reduce run-off and urban flooding due to channelized water flows. Rain gardens have been introduced. Green belts enshrined in legislation to protect urban aquifers. But much more is needed. The administrators in Piacenza, by design and necessity, always knew about the relationship between the urban water flow and the rural use of the canals for irrigation. Today, many in cities have no notion of the watershed from which they draw their water supplies or the other uses of water within their ecological context. In order to better conserve and use water these relationships will have to become more explicit. This is already happening in places like Australia, where long-term drought has forced a reassessment of water supplies in several urban and rural areas. This kind of understanding will have to spread as more cities, especially in places like the southwest USA, will be forced to confront water scarcity within their regions. Linking urban water supplies to the larger watershed and its management is a connection we need to rediscover.

The ability to collect water, organize its use technologically and socially, and distribute it for a multiplicity of purposes to diverse users, can be quite a large social and spatial enterprise. The development of pumps, and later computer technology, enabled urban administrators to run the water utilities as centralized systems that were controlled by engineers at specific locations. This freed city managers from dependence upon the independent contractors like millers and the local consortia who owned and administrated parts of the Piacenza system. Social conflict has been smoothed out by universal, centrally controlled systems in many cities for water provision and sanitation. These systems require little more than monthly bill payments from the users and those can be done through automated banking. This frees the user from any real connection to the

resource or other users. But issues of water conservation and purity loom large with new ways of polluting the resource from injection of chemicals into precious underground aquifers to pseudo-estrogens and other drugs excreted into water supplies. As climate shifts and alters patterns of precipitation, the potential for large and small scale conflicts over water usage increases.

All cities inhabit a larger watershed and must respond to the dynamics of that particular hydrological regime. Frequently, and often due to the technologies used, we fail to recognize these connections, between city and countryside, between urban water supply and larger regional hydrological cycles. The decisions made about water management often determine how users understand the resource, the utility and infrastructure. These decisions can change over time as the inevitable realities of the local and regional ecosystems force new responses. Swilling comments that cities have all too often been seen as fixed artefacts or subjects, a static space fixed in time. He proposes that cities should be seen as “emergent outcomes of complex interactions between overlapping sociopolitical, cultural, institutional and technical networks, that are, in turn, in a constant state of flux as vast socio-metabolic flows of material resources (water, solid waste, sewage, building materials, electricity), bodies, energy, cultural practices and information work their way through urban systems that are simultaneously routinised, crisis-ridden and transformative.”¹⁰ For Swilling, this is the very definition of urbanism. Piacenza, through its canals, had to deal with the material flows of water and sewage in ways that were routine, periodically involved crises, and both spatially and socially transformed and shaped the urban habitat. This socio-metabolic flow through the city determined much of its economics, population health, and demographics.

Human survival means decisions must constantly be made about available resources and their management, especially within population collectives. Dense human settlements intensify the need for continual decision-making that affects the urban space. These material results make visible the processes and patterns of how humans shape their landscapes. Increased information about the processes of human decision-making and the

¹⁰ Mark Swilling, “Reconceptualising urbanism, ecology and networked infrastructures”, *Social dynamics: A journal of African Studies*, 37 (2011):1, 79.

resultant patterns of use is critical to our knowledge of cities and how they function. The story of urban water management in Piacenza gives us a glimpse into the life experiences that motivated people as they shaped their urban habitat. Thus it is possible, due to the nature of human habitations, for lessons to be learnt from the experiences of other people in other places and times.

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Images Sourced from the Internet:

Figure 2-1: Italy at the end of the 16th century with the duchies of Parma and Piacenza. Highlight added. From: University of Texas at Austin. Cambridge Modern History Atlas, 1912. <http://www.emersonkent.com/map_archive/italy_16th.htm>

Figure 2-2: Po River valley and watershed with city of Piacenza, and Trebbia River marked. From <<http://www.adbpo.it/on-line/ADBPO/Home.html>> .

Figure 2-10: View of the Via Francigena from Canterbury to Rome as it crossed through Europe marked with major towns and cities.
<<http://compostela.pellegrinando.it/sezioni.php?seid=1920>>.

Figure 2-17:Piazza Cavalli (originally Piazza Grande) looking east to the church of San Francesco. Photo taken on June 14, 2011 by leochiodojans from
<<http://www.panoramio.com/photo/54247724>>

Figure 2-28: Hydrologic cycle. < <http://www.isws.illinois.edu/docs/watercycle/>>

Figure 3-2: Topographical map of Emilia-Romagna region of Italy.
<<http://www.worldmapsinfo.com/map-of-emiliaromagna-italy-europe.html>>

Appendix A: Convocati

Date	Main canal	Other rivi	To	From
1575, 18 nov	Rivo Meridiano			Gov, Priore, Russio, N Sopranus, Co: M Caratorus, L Cremasore, Arcelli, F della Volta, A Blanchus, ? H Rupta
1606, 6 april	Rivo Sta Vittoria			
1611, 14 may	Beverora			Gov, Alfonsus Angla Priore, Ludonicus de Casate, Marchio Cesar Ma Scottus, Io: Bernus Rolerius, Co: Christoforo Lando
1611, 4 june	Beverora			no Casate and Lando, add Julius Cesar Arcelli
1611, 9 jun				absent: Scotto
1611, 18 jun				Gov and Priore, Casate, Arcelli
1611, 21 jun	Beverora			Absent: several
1611, 9 july				Gov, Priore, Lando, Angla
1616, 19 jan				Pro Gov, Arcellus- pro Priore, Relerius, Lando
1616, 14/19 may	Rivo Piccinino			
1616, 26 may	Beverora			Gov, Priore, Rolerius, Landi, Arcelli
1616, 23 aug				Gov, Landi (pro Priore)
1616, 2 sept				Pro Gov, Lando (Priore)
1616, 17 sept				Gov, Arcellus - pro Priore, Relerius
1616, 22 sept				Gov, Arcellus-pro Priore, Relerius
1616, 13 oct	Beverora			Gov, Priore, Scotto, Angla, Rolerius
1616, 15 oct	Beverora			Gov, Angla-Priore, Rilerius
1616, 17 nov				Gov, Arcelli-Priore, Scotto, Rilerius
1617, 18 may	Beverora			Gov, Rilerius - Priore, Angla, Lando
1618, 5 july				Gov, Priore, Angla, Arcelli

Date	Main canal	Other rivi	To	From
1618, 13 oct	Beverora			Gov, Arcelli - Priore, Rilerius
1620, 23 may	Rivo Trebbiola			
1625?	Rivo della Gosa			
1635, 30 apr				
1642, 23 jun	Rivo della Zecca	Rivo Beverora		
1646, 31 jan	Rivo Sto Agostino			
1646, 19 april				
1646, 2 aug	Rivo Piccinini	Rivo Beverora		
1646, 23 aug	Rivo Sto Agostino			
1646, 10 sept				
1646, 22 nov	Rivo San Savino			
1647, 16 may	Rivo Meridiano			
1647, 28 jun	Rivo Sto Agostino	Rivo Meridiano	S Rubino and Cattaneo	
1648, 29 nov				
1650, 2 may	Rivo Meridiano			
1650, 5 july	Rivo Meridiano			
1652, 23 may	Rivo Meridiano			
1652, 25 may	Rivo Meridiano			
1653, 13 jun	Rivo Sto Agostino			

Date	Main canal	Other rivi	To	From
1654, 18 may				Gov, Priore, Aloyius Scotto, Fernando Angla
1660, 29 jun	Rivo Meridiano			
1668, 2 jun	Rivo Sto Agostino			
1670, 11 sept	Rivo San Siro			
1671, 18 may	Rivo San Siro			
1671, 11 jun	Rivo San Siro			
1671, 15 july	Rivo San Siro			
1671, 21 july	Rivo San Siro			
1671, 21 july	Rivo San Siro	Meridiano, San Savino		
1671, 14 aug	Rivo San Siro			
1671, 5 sept	Rivo San Siro			

Appendix B: Water Legislation and Reform documents

1. Ancient statutes for water

Monograph

Statuta et decreta, antique civitatis Placentias

Rubriche estratte dal Libro V

Riferentisi al Governo delle Acque

Ristampate tradotte per ordine del municipio MDCCCLXXXIX 1899

Piacenza – tip edit giacomo Favari

Catalog #: 990 VII 6(47), in latin and Italian, 10 pages

Dell acque e dei rivi:

Chi conduce le acque agli orti, giardini o campi situati fra la citta et bobborghi, overo ai giardini ed orti vicini alla citta, entro il raggio di mezzo miglio, no potra, in causa, del suo adacquare, essere accusato molestato, impedito o in qualsivoglia modo condannato; ma potra invece condurre liberamente e impunemente quelle acque ai luoghi predetti, e cio senza bisogno di licenza dal giudice delle acque o da alcun altro ufficiale. Che se nelle dette occasioni sara da alcun ufficiale o notaro molestato, cotali molestatori saranno multati di 20 lire piacentine, e dovranno essere sottoposti ad inchiesta.

Degli aventi la testata:

fu stabilito e da lungo tempo osservato che tutti coloro che hanno la testata, ossia l'estremo lembo dei proprii terreni confinante con qualche rivo, possono lecitamente avere ed estrarre la quindicena dallo stesso rivo

del raddoppiamento delle pene:

ordiniamo che in tutti e singoli gli allennati delitti, se commessi di notte o sull'area della citta di Piacenza o nelle case del Comune, le penje siano raddopiate; ed intendesi per notte l'intervallo fra il suono delle campane, dal tocce dell'avemmaria vespertina al tocco dell'avemmaria mattutina. Tutto cio si applichera nel presente e nel futuro, e per area del Comune s'intendera lo spazio racchiuso tra i rivi che le scorrono intorno.

Di coloro che possono condurre (scavare) rivi:

Fu stabilito e da lungo tempo osservato che chiunque ha il diritto di condurre od estrarre acque o rivi dai fiumi dalle sorgenti e dagli scolatizii del distretto di Piacenza, o in qualsivoglia altro

modo possa condurre cotesti rivi ed acque pei terreni e campi di qualsivoglia persona col minor danno del proprietario o dei proprietarii delle terre per le quali si conducono o si condurranno detti rivi od acque, avendo queste persone, a scelta, o la quindicena dei detti rivi ed acque, oppure tanto dai conducenti le aque, quanto valgono le terre su cui si conducono dette acque o rivi. In quest' ultimo caso dette terre sarrano stimate ad arbitrio d'un compromissario in ragione della quanita occupata dal cavo di detto rivo od acqua. E se il conducente quell'acqua vietera al proprietario della terra di ricevere e godere della quindicena, come sopra e detto, verra ogni volta condannato a 20 soldi piacentini. Nello stesso modo chiunque, per le cui terre si condurra o si conduce la detta acqua o rivo, potra a proprie spese condurre la stessa acqua, per cavo o rivo liberamente defluisca e scorra a vantaggio del conduttore: salvo che colui, per le cui terre si conduce od estraie la quindicena, non potra dalla detta quindicena prendere la quindicena, ma il contuttore della detta quindicena sara tenuto a pagare a prezzo di stima al proprietario il valore della terre occupata.

Di coloro che hanno il possesso o il quasi possesso di condurre acqua da venti anni:

Se alcuno avra derivato acqua da qualche fiume pubblico o sorgente o scolatizio, e sara stato egli e il suo autore, oppure l'uno o l'altro di essi in possesso o quasi-possesso per venti anni continui del diritto de derivare quell'acqua, non potra essere molestato da chiunque si dica di avere dai detti venti anni in poi causa o titolo dal Comune di Piacenza: a meno che fondi le sue pretese sopra altri diritti. Se invece non avra provato il detto possesso o quasi- possesso, sara preferito che avra avuto un titolo recente dal Comune di Piacenza, e nel possesso il Comune di Piacenza dovra garantirlo. Cio avra luogo in tutti i casi passati, presenti e futuri.

Della pena di chi non fa asportare gli spurghi:

Chiunque avra fatto espurgare un rivo nella citta di Piacenza e tenuto a far togliere gli spurghi estrattine entro i cinque giorni susseguenti allo spurgo, sotto pena di 5 soldi piacentini; e tutti i mugnai che conducono rivi per la citta saranno tenuti a spurgarli una volta all'anno e trasportare gli spurghi a loro spesa sotto pena di 9 soldi piacentini per ogni contravvenzione e per ognuno di essi, oltre all' obbligo sudetto.

Del sistema da tenersi quando si dividono le acque delle Trebbia

Per evitare gli scandali che spesso nascono dai riparti delle acque, d'ora in poi ordiniamo che quando alcuno chiedera che si dividano le acque del Trebbia o del Nure, e questo in tempo di siccita, il Podesta sara obbligato a far bandire pubblicamente per la citta e a suon di tromba nei luoghi soliti. Che tutti coloro cui riguarda l'affare e che vogliono contraddire od opporsi a che si faccia la dette divisione, compariscano avanti il podesta o il giudice dei maletizii in un certo termine da determinarsi in quella grida: dopo di che, il giudice dei malefizzii insieme con tre o almeno due, maestri del'acqua, si rechera a quei fiumi, e con lui potranno andare anche gli interessati, e fattasi dai maestri le stima della quantita d'acqua in presenza del detto giudice, se sara caso che l'acqua debba dividersi, la si dividera, e non altrimenti. Questo statuto dovra

asservarsi e mandarsi inviolabilmente ad esecuzione dal Podesta e da suoi giudici. Sotto pena di 50 lire piacentine per il Podesta e di 25 per ogni giudice; nella qual pena incorreranno pel semplice fatto della non osservanza.

Delle acque

Il podesta o alcun altro ufficiale non potra costringere ad alcun contributo per qualsivoglia spesa di rivi o di acque nessuno che non sia consorte o comproprietario degli stessi rivi od acque.

Dello stesso argomento

Fu stabilito che chi avra condotto e fatto condurre un rivo o un acqua per la citta o distretto di Piacenza, deve incarvalare e derivare quell'acqua a sue spese, per modo da non recar danno ad alcuna via pubblica o privata ne a qualsiasi persona. Il contravventore sara condannato in 40 soldi ogni volta, ed inoltre sara tenuto a risarcire il doppio del danno arrecato a chi lo ha subito.

Dello stesso argomento

Sulle questioni di acque e rivi si procedera, consoscera e decidera dal podesta o giudice dei malefizii in via piana e sommaria e senza citazione e formalita di giudizio in tutti, giorni feriali e non feriali; eccettuate le feste in onore di Dio.

Dello stesso argomento

Eguualmente fu stabilito e da lunga tempo osservato, che i partitori del Rivo che vien detto dei canali debbono essere applicati e mantenuti dalla beccheria di Santa Brigida in poi, a spese di coloro al quali appartengono detti partitori o i rivi su cui si rovano. Il podesta sara obbligato a curare cio entro un mese dalla sua entrata in ufficio. Per modo che una quantita sufficiente di acqua fluisca liberamente per il rivo che scorre sotto i sedili del Comune, e sia lavata la latrina dei detti sedili

Dello stesso argomento

Chiunque conduce o condurra acqua pei rivi macinatori che tagliano o taglieranno la strada Romea o la strada di Rivergaro o la strada che conduce a San Giorgio or la strada che mette a Podenzano ed Albarola o la strada Cremonese o la strada Montanara, sara tenuto a fare sopra gli stessi rivi nel punto dove tagliano quelle strade ed entro la festa del San Michele prossimo venturo o al piu presto che sara possibile dei ponte in pietra e calcina con buone volte e delle sufficiente ampiezza di 6 braccia almeno tra le sponde, sotto pena di 25 lire piacentine. La qual pena sara pagata da coloro che derivano quei rivi e sara divisa tra loro in proporzione dei rispettivi diritti d'acqua, fermo sempre restando l'obbligo di fare gli stessi ponti. Il podesta od ufficiale a cio delegato sara tenuto alla pena di lire 50, nella quale, quando faccia altrimenti, incorrera issofatto, trascorso il detto termine distruire e far constare delle cose predette e condannare chi avra trascurato di adempiere agli obblighi predetti. Il podesta sara obbligato a far

bandire questo statuto in qualsivoglia mese sotto la pena predetta, nella quale incorrerà issosatto, se si sarà diportato altrimenti

Dello stesso argomento

Chi conduce o condurrà acque pei rivi macinatorj od altri anche irrigatorj, e taglia o taglierà qualche strada pubblica o privata, sarà obbligato a fare sopra le stesse strade nel punto ove sono tagliate entro tre mesi e al più presto possibile dei ponti adatti in buon legname e abbastanza robusti da potervisi liberamente e sicuramente carreggiare e cavalcare nel mezzo di dette strade, sotto pena di 100 soldi piac. Tale pena sarà ripartita tra coloro che conducono gli stessi rivi o canali irrigatori in proporzione dei rispettivi diritti. Costoro saranno inoltre tenuti a costruire gli stessi ponti. Il podestà o l'ufficiale a ciò delegato sarà tenuto alla multa di 25 lire pic. , nella quale incorrerà, quando si sia altrimenti regolato, trascorso il detto termine d'istruire, far constare delle cose predette e condannare chi avrà trascurato d'adempiere al presenti obblighi. Il podestà farà bandire pubblicamente il detto statuto in qualsivoglia mese sotto la pena anzidetta, nella quale incorrerà issosatto, diportandosi diversamente. Salvo ciò che è stabilito dove si parla dei ponti in pietra da farsi in certi casi e in certe strade: il che si osserverà nei casi speciali.

Dello stesso argomento

Fu stabilito e da lungo tempo osservato, che chiunque ricervesse acqua o la estraesse da qualche rivo non suo o al quale partecipi, ma in giorno ed ora che non gli sarebbe spettata, od oltre le sue competenze, sarà condannato per ogni volta a 40 soldi piac. e a risarcire il danno a chi lo patì. Si presume che abbia dedotto l'acqua colui nei cui prati o terre l'acqua stessa sarà stata trovata. Si aggiusterà fede al proprietario di detta acqua o rivo, o a chi si trova in possesso o quasi-possesso del diritto della stessa acqua o rivo, purché osservi con giuramento le cose dette o qualcuna di esse, e di danno proprio e la misura in cui lo risenti nella indicata occasione fino a 20 soldi piac. Per questi effetti il danneggiato dovrà esser nativo della città di Piacenza e persona di buona fama e condizione. Un danno maggiore di 20 soldi dovrà esser provato legittimamente. Questo statuto però non troverà applicazione quando si tratti di mugnai, per ciò che riguarda la fede da prestarsi al loro giuramento circa il danno e la entità di questo.

Che non si debban far chiuse sui rivi

Nessuno potrà fare in alcun rivo chiusa veruna, se non di assi, sotto pena di 20 soldi piac. per ogni volta ed oltre l'obbligo di rimuovere la detta chiusa.

Di coloro che non pagano il contributo al rivi

Fu stabilito e da lungo tempo osservato, che, se più persone hanno avuto un'acqua o un rivo in comune, e alcuni di detti consorti o anche tutti hanno derivata la detta acqua ed hanno fatto il cavo od alveo di detti rivi o canali o altri lavori necessari per condurre la detta acqua o rivo; quei consorti che non hanno pagato e non vogliono pagare la parte loro spettante in dette spese fatte

dopo avere avuto il consenso del consorte e dopo averlo legittimamente richiesto ed atteso pel tempo legittimo ossia per lo spazio di tre giorni, non possono ni debbono godere di detta acqua ne avere o prendersi la loro parte di detta acqua in alcuna occasione o modo, se prima non paghino al massajo del rivo o a chi avra fatto le dette spese, la parte loro spettante; e non possono ne debbono avere alcun cavo per cui estrarre l'acqua da detto rivo, e se lo avessero, il podesta od i giudici di lui saranno tenuti ad azionarlo e a fargli colmare detto cavo o canale irrigatorio entro 8 giorni da quando cio sara portato a loro notizia. Il contravventore sara condannato e il podesta sara tenuto a condannarlo e multarlo di 100 soldi piac. a favore del fisco e per ogni contravvenzione.

Che il Podesta deve eccitare i consorti a dividere l'acqua

Fu stabilito che se qualche rivo od acqua appartiene in comune a piu consorti e alcuno di questi voglio dividere e ripartire la detta acqua col mezzo di paratoia, il Podesta o giudice dei malefizii deve dopo una breve dilazione costringere i consorti riluttanti a dividere e ripartire la detta acqua e a pagare la propria parte di detta paratois e le spese che saranno per farsi nella detta occasione; e, frattanto, quello dei consorti che avra fatto quelle spese potra trattenere la stessa acqua e godere anche la parte del consorte, finche le dette spese non gli sieno state rimborsate.

Della quindicena delle acque

Fu stabilito e da gran tempo osservato che la quindicena delle acque viene ricevuta dagli aventi diritto in ogni venerdi al tramonto del sole, e viene trattenuta fino al tramonto della Domenica successiva. Chiunque terra o ricevera altrimenti detta quindicena, sara punito ogni volta con 40 soldi, oltre all'obbligo di risarcire il danno a chi lo avra risentito per questo fatto.

Di coloro a cui tocca la quindicena delle acque

Fu stabilito e da lungo tempo osservato che quelli ai quali appartiene la quindicena delle acque possono estrarla, riceverla, e condurla pei terreni altrui, pagando il giusto prezzo della terra occupata dal cavo o letto per cui viene ricevuta e condotta la stessa quindicena, al proprietario di quella terra che sara stimata a giudizio d'un arbitro.

Di coloro che godono la quindicena indivisa

Nessuno potra, sotto pena di 60 soldi piac. per ogni volta, ricevere o estrarre quindicena da alcun rivo, se prima tutta la quindicena di detto rivo non sara stata divisa tra gli aventi diritto alla stessa quindicena. Dividesdosi la quindicena tra gli aventi diritto, ciascuno ne avra una parte proporzionata alla quantita della terra di testata e dei trabucchi della terra di testata contigua collo stesso rivo.

Ad eseguire questa divisione, il Podesta o giudice dei malefizii sara tenuto sopra domanda di chiunque abbia a fare nella stessa quindicena a ricercare tutti gli interessati nella quindicena e a fissar loro un giorno determinato siccome termine per compiere la stessa divisione col mezzo dei

maestri delle acque. E se in quel giorno nessuno si presentera, non per questo verra impedita detta divisione, ma sara compiuta dagli stessi maestri, secondo la forma accennata e della divisione ed assegnazione che si fara a ciascuno e per la parte che gli si fara verra redatto pubblico istrumento. S'aggiunga che coloro i quali avranno pagato le spese della predetta divisione potranno trattenere la parte di quindicena spettante a chi non paga la propria parte di spesa, e potra goderne, finche questa non venga pagata. Il presente statuto si leggerà in pubblica e sara pubblicamente bandito per la citta una volta per ogni mese di maggio. Il podesta e il giudice dei malefizii saranno tenuti a osservare inviolabilmente questo statuto, sotto pena di 25 lire piac. nella quale incorreranno issofatto, se avranno stimato di fare altrimenti.

Di coloro che hanno la testata dei terreni vicino ai rivi

Per togliere le frodi che avvengono nell'estrarre le quindicene dai rivi e nel dividerle, quando chi ha la testata dei terreni confinanti coi rivi in ghiaietti o gerbidi non soliti a essere coltivati o mondati (dai sassi) tenta d'aver la quindicena in proporzione del numero dei trabucchi della testata dei predetti ghiaietti o gerbidi: il che e contrario all'intenzione di chi stabilisce le stesse quindicene, perche la quindicena si concede in compenso del danno arrecato dal cavo del rivo che si fa nei terreni altrui, mentre nei detti ghiaietti non deve aver luogo, perche il predetto cavo non arreca alcun danno; dichiariamo che tali testate di ghiaietti o di gerbidi non si debbono computare nelle quindicene tanto la misura quanto per la divisione di esse quindicene, sicche nessuna quindicena sia cavata da essi terreni o per essi terreni. Salvo che i proprietari di quei ghiaietti o gerbidi non volessero ridurli in tutto o in parte a lavoro senza frode; nel qual caso essi avranno la quindicena in proporzione del numero dei trabucchi di quella testata di terreno ridotta a lavoro, secondo il disposto dello statuto che stabilisce intorno all'obbligo di dividere le quindicene. Costoro pero non potranno derivare la quindicena, ne goderla se non per quelle terra ridotte a lavoro. Se sopra alcuna di queste cose naschera questione conoschera il podesta o il giudice dei malefizii e sommariamente senza solennita di giudizio, e senza bisogno di citazione in qualunque tempo feriale e non feriale.

Dei diritti d'acqua da concedersi dal camerario

Tutte le concessioni di diritti d'acqua fatte e da farsi dal Camerario del Comune di Piacenza, delle quali siasi eretto pubblico istrumento, saranno vacide ed efficaci, salvo lo statuto che parla del possesso o quasi-possessione delle acque e dei rivi per 20 anni, al qual non s'intendera fatta alcuna deroga dallo statuto presente

Delle divisioni delle acque

Quando si fanno le divisioni delle acque nella diocesi di Piacenza, il Podesta e tenuto a mandare uno de suoi giudici, cioe il giudice dei malefizii, perche intervenga alle stesse divisioni e si evitino le risse e scandali che ne possano originare

Che i rivi della Citta debbono essere terminate e suolati

E statuto antico che tutti i rivi della citta di Piacenza che non sono ultimati o suolati, debbono, sopra domanda di chiunque v'abbia interesse, essere terminati e pavimentati per cura dei maestri delle acque, e mantenuti da coloro che vi conducono l'acqua nella condizione in cui saranno stati ridotti da quei maestri. A far eseguire cio, il podesta sara tenuto sotto pena di 25 libbre.

Dei ripari dei rivi

Del pari fu stabilito che i ripari dei rivi scorrenti per la Citta di Piacenza e specialmente pel Borgo, sieno adattati in modo che i carri e carretti possano condursi per le strade vicine ai detti rivi comodamente e senza detrimento dei bovi e dei carri

Di coloro che derivano l'acqua

Fu stabilito che chiunque sara trovato mentre va o viene per le ripe di alcun rivo a scopo di derivazione d'acqua per irrigare prati o terre ovvero per custodire l'acqua dei rivi, non possa ne debba mai essere denunciato o in alcun modo condannato, purché non abbia arrelato alcun danno.

Degli impedimenti sul Rivo Comune

E antico statuto che tutti coloro i quali hanno ponticelli, pietre, fogne, siepi e banchi cfhe facciano impedimento nel rivo comune che scorre dalla chiesa di Stanta Brigida fino al Palazzo del Comune, sono tenuti a far rimuovere totalmente detti ostacoli, o almeno a farlo spurgare a proprie spese, ogni qualvolta si dica che pei motivi suindicati il rivo non puo avere un comodo deflusso.

Il camario del Comune puo vendere le acque

Fu stabilito e da lungo tempo osservato che qualunque camerario del Comune di Piacenza puo vendere e concedere al prezzo consueto i diritti d'acque cosi sorgive, scolatizie, pluviali ed altre, come dei fiumi della Citta e distretto di Piacenza a chiunque della Citta o diocesi di Piacenza, sottoposto alla giurisdizione dello stesso Comune e che militi per esso. Il compratore potra derivare le dette acdque e condurle a suo aggradimento per li terreni altrui, pure che i proprietari di questi abbiano il risarcimento del danno o la quindicena della stessa acqua a loro scelta. E cio avra luogo tanto nei casi passati come nei futuri, salvo lo statuto che parla di coloro che sono stati in possesso o quasi-possesto per 20 anni continui del diritto di derivar acqua, ovvero in possesso o quasi-possesto delle stesse acque o rivi.

Nota: la presente traduzione delle rubriche dello Statuto Piacentino che provveggono al regime delle acque venne condotta dal sottoscritto attendosi scrupolosamente alla lettera nel testo, massime la deve le disposizioni dello Statuto sono piu importanti e possono dar origine a controversie giuridiche, fondate sopra diversita d'interpretazione

Solo dire per chi non ha pratica di Statuti Comunali Medioevali, che il giudice dei malefizii (judex maleficiorum) era uno dei giudici (a Piacenza sette) che rendevano ragione, seconda la costituzione Comunale, e vegliava specialmente all'amministrazione della giustizia penale repressiva e preventiva – il 'camerarius' era per dirlo con frase moderna. Il ministero delle Finanze e del Tesoro di quei piccoli stati e di quei tempi: vegliava alla conservazione e all'incremento dei diritti patrimoniali del Comune, e percepiva, come rappresentante del fisco, la quota sulle pene pecuniarie (abbondantissime in allora) attribuitagli dagli statuti.

Il traduttore

2. 1470 Reforms

Monograph 990 VII 6 (18)

Municipio di Piacenza

Capitoli per il regolamento delle Acque di Trebbia , anno 1470 (15 Ottobre)

Stampati per ordine del municipio nell' anno 1900

Piacenza – tip Edit giacomo Favari

In latin with Italian translation

Al foglio 118 del Volume decimo ottavo delle Provvisioni della Comunita di Piacenza, segnato con lettere H I trovasi quella del tenor seguente:

1470 Indizione ottava addi 15 del mese di Ottobre

Convocati e congregati gli infrascritti Signori Priore ed Anziani soprintendenti agli affari del Comune di Piacenza, nella Cappella nuova del Comune medesimo dove sono soliti convocarsi e congregarsi al suono della compana ed all'avviso dei corrieri per la trattazione degli affari stessi, come e di costume, per ordine dello spettabile e generoso uomo il Signore Bartolomeo de Meli di Cremona, Podesta Ducale di Piacenza. Nel qual luogo sono intervenuti: il Magnifico Signor Princivallo Lampugnano Aulico Ducale e Commissario di Piacenza e l'egregio dottore in leggi Gaspare di Vollogno vicario e luogotenente del prefato Signor Podesta ed il Signor Giacomo degli Ardizzi di Piacenza Referendario e Giudice delle Gabelle e delle Acque. E per anziani, cioe:

I Signori Guglielmo Mazolla Priore in luogo di Cristoforo duo figlio,

Bartolomeo Paveri Fontana,

Stefano Volpe Landi,

Francesco Arduzzi, in luogo di biagio suo padre,

Stefano della Puglia in luogo di Antonio suo padre,

Bernabo di Castelnuovo Notaio,

Pietro Lodovico Bagarotti,

Leonardo Riccio,

Cristoforo Saffignano in luogo di Bartolomeo suo padre,

Antonio Fontanili,

Daniele Malvicini Fontana,

Bartolomeo Alone.

Detto Signore Priore ha in questo modo esposto agli stessi Signori Anziani: che già dai Signori Anziani e soprintendenti ai detti affari del Comune di Piacenza furono eletti il detto Cristoforo suo figlio, Girolamo Bracciforti notaio, Pietro Bellogio e Pier domenico Mussi. E dopo sono stati agli stessi aggiunti: Battista Chiapponi, Giovanni Vicedomini, Sebastiano da Rizzolo e Gabriele delle Posterla, i quali avessero a trovarsi col prefato Signor Referendario. E come sopra, e con esso trattare e diligentemente cercare il modo di condurre la detta acqua del Fiume Trebbia alla Citta di Piacenza, e firerire di poi il loro parere ai detti Signori Anziani, giusta quanto si contiene nella provigione scritta nel giorno sette di Settembre prossimo passato, alla quale si abbia relazione, per sedere le querele dei mugnai e di altri cittadini di Piacenza.

E che sopra cio, dal detto Signor Referendario, e come sopra, sono stati fatti diversi capitoli sui quali, da diversi dei medesimi eletti sono state fatte certe addizioni e diminuzioni anche per utilita di tutti quelli che hanno diritto negli altri rivi che scorrono dal detto Fiume Trebbia: E che ieri si trovarono uniti in presenza dei Signori Commissario, Referendario, e come sopra, per finire gli stessi capitoli, cioe: lo stesso Guglielmo, in luogo di detto suo figlio, i detti Gerolamo, Pier Domenico, Giovanni Vicedomni, Sebastiano da Rizzolo e Gabriele della Pusterla, non avendo gli altri due potuto intervenire per essere stati assenti dalla citta di Piacenza. E finalmente, da tutti sei, visiti, letti e considerati i detti capitoli, gli stessi sono stati conch usi nella forma in cui ora lo stesso Signor Priore quivi presenta, salvo che sopra il primo capitolo e insorta fra loro contesa sulle parole cosi espresse: “la bocca del Rivo Comune e Piccinino che si estrate dal Fiume Trebbia” le quali parole debbano essere seguite da questo altre cioe: “e che e solito imboccarsi dal Conte Manfredo Landi e suoi antecessori e mettitori nelle ghiaie e terre del medesimo Conte Manfredo etc.” Quattro di essi sono stati favorefoli all aggiunta e due contrarii. Per la qual cosa e bene che dei Capitoli stessi si dia lettura e si approvino a respingano e si aggiunga o tolga secondo che parera alla maggior parte dei Signori Anziani. Detto cio: lo stesso Signor Priore ha ordinato a me Notaio e dittatore infrascritto di leggere i detti Capitoli a piena udienza ed intelligenza di tutti e singoli i presenti. E letto e considerato tutto cio che era da considerarsi tanto per utilita del Comune di Piacenza, quanto di tutte e singole le altre persone, e per l'indennita della Ducal Camera hanno approvato i Capitoli stessi nella forma seguente, togliendo le dette parole del detto primo Capitolo che dagli stessi eletti non era stato compilato. E cosi hanno provveduto, stabilito ed ordinato in tutto e per tutto, e come si contiene negli stessi Capitoli.

I quali Capitoli che sono in numero di ventitre, son del tenore seguente.

Primo: imperocche hanno ordinato che la bocca del Rivo Comune e Piccinino per la quale si estrate l'acqua del Fiume Trebbia debba rimanere ove attualmente si trova. E che niuna

innovazione sia fatta alle bocche bastarde esistenti presentemente entro la detta bocca del Rivo stesso del Comune e Piccinino, salve le infrascritte, senza pregiudizio però dei diritti del Comune di Piacenza.

II. hanno ordinato che alle dette bocche bastarde, che sono dei nobili, e per le quali è condotta l'acqua. D'accordo coll'Ingenere deputato dal Comune di Piacenza ed il giudice delle acque, debbano mantenere le berline con buone serratura e catenacci nel modo infrascritto e vi siano adattate in modi tale che non possano né impedire né ritenere l'acqua necessaria a far macinare i molini esistenti entro la Città ed i corpi santi di Piacenza. E che nel tempo delle divisioni meno sei Canale d'acqua da Molino; e nel Piccinino abbiano a correre cinque Canale d'acqua da Molino: le quali in tutto sono Canale undici d'acqua come è disposto tanti per i diritti del Comune quanto per antica consuetudine: e ciò, purché vi sia acqua sufficiente nel detto Fiume Trebbia e purché esse Canale undici scorrano alla città di Piacenza per macinare e purgare la città medesima, ed irrigare entro la città e sobborghi, giusta la forma degli Statuti del Comune di Piacenza.

E che quelli che pretendono di aver diritto nel detto Rivo Piccinino facciano scorrere alla detta Città la detta acqua per macinare ed irrigare come sopra, e non altrimenti. E gli stessi che abusino della detta acqua fuori di Città, servendosene ad altri usi che è a macinare, come sopra, nella città stessa, per dano ogni diritto loro spettante, che hanno dalla Communità, se non avranno dimostrato al Giudice delle acque il diritto di aver potuto far ciò.

Sia lecito però ai poveri di San Lazzaro di far scorrere impunemente l'acqua nel loro Rivo vicino alle loro case per macinare e per altri loro bisogni

III. Che adattate le dette Berline, a niuno sia lecito rimuoverle, guastarle o farle guastare, sotto la pena di lire venticinque imperiali per ogni volta a ciascun contravventore: del qual danno ed innovazione fatta, si stia al giuramento dell'ufficiale o dei campari deputati alla custodia della detta acqua ed approvati dal Comune di Piacenza e dal giudice delle acque: E la qual pena si applichi per una terza parte alla Communità di Piacenza, per altra terza parte al Giudice predetto e l'altra si Daziarii della macina. E quando non si possa avere chiara notizia del falsatore, si condanni quello a quelli sulle terre dei quali sia stata trovata la detta acqua.

IV. Per indennità dei nobili hanno ordinato che se alcuno abbia sottratta indebitamente l'acqua delle terre e dei Rivi di coloro che hanno diritto di condurre le acque stesse, salvo che nel tempo della quindicena, come è chiaramente espresso nei presenti ordini, si punisca e si condanni in lire dieci imperiali per ciascuna volta, oltre l'ammenda del danno sofferto, da applicarsi come sopra; e s'intenda aver rubata l'acqua colui sulle cui terre sia stata trovata. E di questo si stia al giuramento di quel cittadino e di quella persona lesa, con un testimonio degno di fede, o dei soprascritti Campari, non ostante alcun statuto in cui, in questo caso, si pone solamente la pena di due lire, per questo, che a pena leggiera si commettono molte frodi.

V. Che il Signor Giudice delle acque debba far adattare tutte le berline dei Nobili che hanno il diritto di quindicena nei detti Rivi Comune e Piccinino con chiavi e catenacci, e che le chiavi si consequino e rimangano giusta il solito presso lo stesso Signor Giudice cioè: le chiavi dei Rivi Bastardi delle quali è detto nel soprascritto secondo capitolo, si consegnino e si debbano consegnare all'Ufficio del detto Signor giudice, il quale a sua volta le debba consegnare ai detti mettori delle acque, agenti per il Conte Manfredo Landi, affinché possano servire tanto al Rivo Comune che al Piccinino ed altri Rivi de Nobili e cittadini di cui sopra, fino al tempo della siclita e della divisione delle acque, nel qual tempo, essi mettori, debbano consegnare le dette chiavi al Giudice delle acque il quale, durante il tempo della siccità, debba tenerle presso di se, affinché non si commetta alcuna frode, e con ciò che in qualunque tempo tanto di abbondanza che di siccità l'acqua medesima scorra pei detti Rivi in qualunque giorno della settimana e che liberamente si appongano le berline per avere le quindicene d'ogni rivo, tanto dagli stessi mettori, quanto dallo stesso Giudice delle acque, riferendo debitamente ogni volta: così che all'ora di nona del Venerdì d'ogni settimana siano aperte le berline solamente per avere la quindicena, come sopra, ed all'ora di nona della Domenica seguente si chiudano con tale ordine cioè: che nell'aprire le dette bocche si cominci dalla prima superiore verso Trebbia, discendendo verso Piacenza e nel chiuderle si cominci dalla prima più vicina alla andando ed ascendendo gradatamente verso Rivalta.

VI. Per la conservazione dei diritti del Comune di Piacenza hanno stabilito che se alcuno avente diritto di quindicena abbia estratto in qualche modo l'acqua del Rivo del Comune fuori del tempo limitato e concesso come sopra, si condanni in lire sedici di Piacenza ogni volta che abbia contravvenuto, stando al giuramento dei Campari, deputati sopra la custodia delle acque. Similmente sia lecito al Giudice condannare a suo arbitrio chi abbia guastate le Berline, d'ordine del detto avente diritto di quindicena.

VII. Che il Signor Giudice delle acque, insieme ai Padroni ed agli Anziani abbia il carico di deputare gli ufficiali ed i campari opportuni alla custodia delle acque, d'accordo anche coi daziarii della macina; e che date o presentate la accuse sia tenuto detto Giudice terminare entro un mese il processo e condannare od assolvere gli accusati, ed eseguire la condanna: E che non sia lecito ai Daziarii, né al Comune di Piacenza, né allo stesso Giudice venire in alcun modo a componimento cogli alcusati, se non tutti d'accordo per tale composizione, sotto la pena di venti fiorini imperiali a ciascun contravventore, da applicarsi al Comune di Piacenza.

VIII. Hanno stabilito ed ordinato che si paghi al detto Signor Giudice il salario di soldi sedici di Piacenza per ogni berlina e bocca per la quale si conduca l'acqua si del Fiume Trebbia, sia del Rivo Comune in ogni anno. E ciò per il salario o un ufficiale da mantenersi dallo stesso Signor Giudice, oltre gli altri campari di cui sopra per la custodia della detta acqua, e da eleggersi dal medesimo Signor Giudice coll'approvazione dei Signori Anziani

IX. Hanno ordinato che si debbano apporre ed adattare le Berline sulle bocche esistenti tanto da una parte quanto dall'altra del Fiume Trebbia ad effetto che nel tempo della divisione delle

acque del detto fiume, piu abilmente si possa dai detti mettitori mantenerle nel rivo del Comune di Piacenza.

X. Similmente che i detti mettitori delle acque, deputati dal Conte Manfredo Landi ad imboccare l'acqua della Trebbia, ovvero quelli che in futuro saranno deputati, si obblighino, sotto la pena di lire sedici di Piacenza per ogni volta che avranno contravvenuto, mantenere in tempo di siccita e di divisione delle acque, almeno sei Canale d'acqua da Molino nel Rivo del Comune e nel Rivo Piccinino cinque Canale d'acqua da Molino, la quale scorra alla detta Citta per macinare e come si contiene nel soprascritto secondo capitolo, quando non vi sia legitimo impedimento; e gli stessi mettitori percepiranno annualmente il solito emolumento tanto per la mettitura e manutenzione delle dette acqua, quanto di qualunque altro Rivo che si imbecca nel detto fiume. La quale acqua debba sempre essere mantenuta dai detti mettitori di sotto alle bocche bastarde, sotto la pena soprascritta. Stando, in caso di contravvenzione, al giuramento dei campari e degli ufficiali deputati sulla custodia delle acque.

XI. Si concede ai Nobili che hanno bocche bastarde nel Rivo del Comune di apporre alle loro Berline uni altra chiave e catenaccio oltre a quella che deve stare appresso i detti mettitori e come sopra. La qual chiave essi Nobili possano trattenere presso loro ad effetto che doai mettitori delle acque, od altri non si possa vendere od alienare la loro ragione dell'acqua, purché in tempo di siccita e di divisione si consegnino all'uffizion del Signor giudice delle acque in quel giorno in cui dal giudice stesso siano stati richiesti e come e stato detto della consegna delle chiavi ai mettitori. Sotto la pena di lire sedici di Piacenza a ciascun contravventore da applicarsi come sopra.

XII. Hanno ordinato che gli obbligati, o soliti a spazzare il Rivo del Comune siano tenuti farlo spurgare incominciando alla meta del mese di Marzo e terminando alla fine dell mese stesso, non essendovi legitimo impedimento, da verificarsi dal Signor giudice delle acque, e dalle dette bocche bastarde inferiormente e superiormente, sotto la pena di lire dieci di Piacenza per oognuno dei detti obbligati o soliti, e come sopra, che abbia contravvenuto, o sia stato negligente, da dividersi ed applicarsi al comune di Piacenza per parti e per il restante al Giudice delle acque, affiche gli aventi bocche bastarde possano nei debiti tempi servirsi della loro acqua. Nel caso accadesse che il detto Rivo si purgasse da alcune persone non obligate, per negligenza dei detti obbligati, e come sopra, il detto Giudice costringa gli obbligati stessi, e come sopra, a pagare ogni spesa fatta, ne possano usare della predetta acqua, se prima non abbiano pagate le dette spese fatte.

XIII. Che chiunque abbia fatto chiuise di terra in alcuni dei sopradetti Rivi dei Nobili o dei Cittadini, si condanni in lire dieci imperiali per ciascuna volta, stando al giuramento dell'interessato con un testimonio degno di fede. La qual pena si applichi come sopra.

XIV. Hanno ordinato, per ovviare al danno che deriva ad alcuni nobili che hanno diritto di condurre l'acqua per le bocche bastarde ecc., che i rivi nei quali per consuetudine si conduce tale

acqua si debbano spazzare nel tempo sopra stabilito e limitato per il Rivo del Comune, non essendovi legittimo impedimento, a spese di quei Nobili, o di quelle persone che hanno diritto negli stessi Rivi, nella porzione che a ciascuno di loro spetta; e se alcuno ricusasse o trascurasse di condurre per la sua porzione, si condanni in lire dieci da applicarsi come sopra, ne possa usare della predetta acqua fino a che non abbia pagata intieramente la sua porzione di spesa.

XV. A maggior comodita anche dei cittadini che hanno il diritto di condurre acqua, si estingua quella Canala d'acqua che si era soliti assegnare per onoranza al Signor Giudice delle acque e cio perche in luogo della Canala stessa hanno provveduto che gli si assegni la terza parte delle condanne come sopra, in vigore dei detti ed infrascritti Capitoli. All' Ingegnere deputato dalla Communita hanno provveduto che per ogni giorno che gli accada di cavalcare per le dette acque abbia il salario di soldi venti di Piacenza da pagarsi da coloro, a beneficio dei quali, perverra la divisione delle acque; e cio in luogo di quella mezza Canala d'acqua che si era soliti assegnargli. Ai mettitori delle acqua nulla, sempra, sia dovuto. Al magnifico Conte Manfredo Landi il quale asserisce di avere due canale d'acqua nel tempo della divisione dell'acqua stessa, si riservi ogni suo diritto che ha secondo la cognizione del Giudice delle acque; e quando abbia assegnato ad alcuno le dette Canale, sia obbligato notificarlo al detto Giudice delle acque, soddisfatto pero prima ai detti Rivi del Comune e Piccinino.

XVI. Hanno provveduto che i mettitori delle acque non possano chiudere alcun Rivo tanto degli altri Nobili e Cittadini e di altre persone, quanto i detti Rivi del Comune e Piccinino al tempi delle quindicene, ma permettano che l'acqua scorra liberamente nei Rivi pei quali negli altro giorni scorre e scorrera, affinche gli aventi a fare nelle quindicene possano godere del loro diritto, sotto pena di dieci fiorini imperiali da applicarsi come sopra.

XVII. Hanno provveduto che il Rivo del Parente e gli altri Rivi che si asseriscono macinatori, in tempo di siccita e di divisione delle acque, debbano avere la loro debita porzione, soddisfatto pero prima il Rivo del Comune e il Piccinino, e facciano scorrere l'acqua stessa alla citta di Piacenza per macinare e non per irrigare i prati, come fino ad ora sono stati soliti fare; e non lasciandola scorrere uberamente alla Citta, per il detto uso per dano all'istante e siano privati del loro diritto, quando non possano addimostrare d'essere stati in diritto di poterlo fare.

XVIII. Hanno provveduto che coloro che sono soliti avere il diritto delle quindicene, e le quindicene stesse percediscono da venti anni in qua in qualunque Rivo che scorre dal fiume Trebbia, possano liberamente averle e riceverle, quando non consti abbiano venduto legittimamente l'alveo o la terra dell'alveo per il quale scorre l'acqua nei detti rivi ed in ciascuno di essi.

XIX. Hanno provveduto ed ordinato che il giudice delle acque sia obbligato esigere tutte le condanne che sia accaduto di fare per dette cause, e solamente di qualunque delle esatte, abbia la terza parte.

XX. Hanno provveduto, come sopra, che a nessuno di qualunque condizione e qualita sia, o ecclesiastico o secolare, sia lecito rompere alcuna strada, argine o riva di alcun rivo, e porre o condurre indebitamente, e contro la volonta del Padrone, l'acqua di un Rivo nell'alveo di altro Rivo, sotto la pena di lire venticinque di Piacenza da applicare ed esigere come sopra.

XXI. Hanno provveduto che la divisione delle predette acque debba farsi solamente nel tempo in cui vi sono nel Fiume Trebbia ventidue Canale d'acqua da Molino, e non prima.

XXII. Hanno provveduto e dichiarato che per i detti capitoli ne per alcuno di essi, ne per alcune parole apposte in essi o in ciascuno di essi, s'intenda concesso. Ne tolto ne derogato ad alcun diritto del Comune di Piacenza ne di altra singolare persona.

XXIII. E le predette cose abbiano luogo precisamente e senza alcun sofisticato intendimento, nonostante qualunque statuto ed altre costituzioni e consuetudini precedenti, alle quali tutte e singole per i presente capitoli sia e s'intenda derogato.

3. 1585 Reform

Monograph – archivio di stato di piacenza

990 VII6 (28)

Ordini per il Reggimento delle Acque di Trebbia Stabiliti l'anno MDLXXXV

Ristampati nell'anno MDCLXXXI

Piacenza – per Gio Bazachi – Stampore Ducale e ristampati nuovamente nell'anno MDCCCLXXXIX in Piacenza per ordine del municipio

Tipografia Editrice Giacomo Favari

Intendendo Sua Eccellenza Illustrissima li gran disordini, et inconvenienti, che nascono alla giornata, per conto dell'Acqua del Fiume di Trebbia, e per il Reggimento d'essa, e le usurpazioni, che si fanno da quelli, che sogliono adacquare, et il gran patimento di questa Citta, quale per il piu non puo havere la sua ragione dell'Acqua, per essergli usurpata da molti, senza alcun premio, o prezzo; e desiderando l'Eccellenza Sua sopra cio provvedere con quel miglior modo si puo, per beneficio, et quiete, cosi del Pubblico, come delli Particolari; et havendo Sua Eccellenza per primo partecipato, e piu volte trattato a lungo di questo negozio, con li Signori Deputati, e particolarmente Eletti sopra cio, per parte di questa Magnifica Citta, o suo Consiglio Generale, quali volentieri in nome d'essa Comunita hanno accettato, et accettano le infrascritte Provisioni Ordini e Capitoli, fatti, stabiliti, e conclusi per l'Eccellenza Sua, accio per l'avvenire habbiano forza di perpetua, et inviolabile Legge, e s'osservino da cadauna Persona, o Persone di quale stato, grado, o condizione siano, etiam Privilegiati

Pero l'Illustre Sig governatore di questa Citta d'ordine, et espresa commissione di Sua Eccellenza Illustriss. Ha fatto, e fa publicare le suddette, et infrascritte Provisioni, et Ordini, accio per l'avvenire si osservino da cadauno Persona, e come dis sopra.

P – Sua Eccellenza Illustriss ha ordinato e dichiara che l'entrata cosi ordinaria, come straordinaria, che si cava, o si cavera per conto dell'Acqua del Fiume Trebbia Territorio Piacentine, e le spese, che si faranno per mantenere l'acqua a questa Citta, e per il Reggimento d'essa, siano, e cedano a beneficio, utile, e danno della Magnifica Comunita di questa Citta di Piacenza, e che il Commissario di Sua Eccellenza Illustrissima deputato, o che si deputerà per l'avvenire (che cosi si riserva Sua Eccellenza di mettergli il Commissario) habbia da rendere conto alli Signori Eletti del Consiglio Generale, o alla maggior parte d'essi, dell'entrata, et uscita

di dett'Acqua, quale Commissario pero habbia da cavare da detta entrata la sua provisione, che gli e stata costituita da Sua Eccellenza Illustrissima, ch e di lire mille l'anno

II. – E piu Sua Eccellenza Illustrissima concede ampla autorita, facolta, e giurisdizione al Commissario di potere comandare a cadauna Persona o Persone, Villaggi, Comuni e Castellanze, di quale stato, grado, o condizione siano, etiam fossero Privilegiati, per mettere, e rimettere e derivare l'Acqua di Trebbia, et inviarla alla Colonna verso questo Citta, e per guardare, e fare custodire li Boschi che si deputeranno per il servizio dell'Acqua predetta, e per far accomodare, e rifare li Ponti, che sono, o devono essere sopra li Rivi, per li quali si conduce l'Acqua; et in somma gli da ogni autorita, facolta e giurisdizione in tutte le cose, e casi concernenti l'ufficio d'esso Commissario, o concernenti gli emergenti, connessi, o dipendenti, e di procedere, e punire esecutivamente i delinquenti, constumaci, o disobedienti in le pene, che da esso Commissario gli saranno imposte, da applicarsi alla Magnifica Comunita di questa Citta di Piacenza, se pene saranno pecuniarie.

III. – e piu sua Eccellenza Illustrissima, per rispetto di sopra la Colonna, da, e concede il Reggimento della datt'acqua al Commissario, a quale concede autorita, facolta, e giurisdizione di poter procedere, castigare, e punire in le pene infrascritt e tutti quelli delinqueranno o non osserveranno, o in alcun modo contravverranno a gli Ordini fatti, o da farsi intorno al Reggimento del' Acqua di Trebbia, o in li connessi, emergenti, o dipendenti d'esso; a quale Commissario sara legito procedere esecutiamente, senza alcuna citazione, e dichiarazione, e per via d'inquisizione, accusa, denuncia, costituito, et in quei modi li pareranno piu espedienti, et esecutiui, e si credera a cadauno Camparo, o altra Persona, che sara deputata alla cura dell'acqua col suo giuramento

IV.- E piu vuole Sua Eccellenza Illustrissima, che sia lecito al Commissario alle volte quando gli parera a lui cavalcare de sotto la Colonna, e trovando alcuno delitto, e delinquente o delinquenti, o che li trova in fragranti crimine, che in tal caso solamente, e non altrimenti, li possa castigare, punire, e procedere contro di loro, et habbi l'intessa autorita, e giurisdizione concessagli di sopra la Colonna, e come di sopra. E per rispetto di sotto la Colonna, vuole sua Eccellenza, che il Sig Referendario principalmente (salvo come di sopra) habbia la cura, e Reggimento delli acqua, e gli concede ampla autorita, e giurisdizione di potere castigare, unire, e procedere contro i delinquenti in le pene infrascritte, etiam esecutiamente, o per via di inquisizione, denuncia, accusa, costituito, e nel modo, e forma gli parera piu conveniente.

V. – E piu Sua Eccellenza concede ampla autorita alli Signori Eletti di questa Citta, o suo Consiglio, con l'intervento pero dell' Illustre Sig governatore, di poter fare quella scielta de Boschi nel modo, e forma che a loro parera conveniente siano di chi si vogliano, etiam che fossero di Persone Privilegiate, et obbligarli, e dedicargli al servizio, e bisogno della dett' acqua di Trebbia; pagando pero il giusto prezzo, o pensione d'essi Boschi alli Padroni; il che concede Sua Eccellenza, trattandosi del beneficio pubblico dell'Acqua, cosa di tanta importanza a questa Citta, e suo Territorio, e fra questo meglio, e sempre, e quando sara il bisogno, e che cosi parera

al Commissario, Sua Eccellenza concede autorità al detto Commissario di poter tuore, e si vogliano, etiam fossero Persone Privilegiate pagandoli per per il prezzo, che sarà dichiarato da uno, o duoi Estimatori, che il medemo Commissario eleggra

Vi. – E piu ha ordinato Sua Eccellenza, e dichiara che questa Citta, o magnifica Comunita sia anteriore a tutti i padroni dei Rivi, cosi legitimati, come bastardi, e che in havere la sua ragione dell' Acqua si sodisfatta prima di tutti gli altri, etiam che fossero Privilegiati e nel modo, e forma ordinerà il Sig governatore di questa Citta al Sig Referendario, e Commissario; perche e mente di Sua Eccellenza, che per l'interesse pubblica la Citta, conforme alle sue ragione, prevaglia a tutti in havere la sua ragione dell'acqua, in ogni tempo, cosi di siccità, e penuria, come, d'abbondanza d'Acqua, all'arbitrio del Sig Governatore, con partecipazione pero delli Signori Eletti sopra di cio da questa Citta, o suo Consiglio Generale.

VII. – E piu ordina e Comanda Sua Eccellenza che sin tanto l'acqua non e in partizione che il Commissario non facci differenza alcuna dalli Rivi Bastardi ai legitimi, ma che l'acqua (salvo come si dira) sia compartita fra tutti, secondo il giudizio del Commissario, a quali Rivi legitimi si dichiara d'ordine di Sua Eccellenza, che non sia perciò fatto pregiudizio alcuno, ma che li siano conservate le loro ragioni tali quali le competono contro li Rivi Bastardi. Vuole pero Sua Ecc che le undici Canali d'Acqua della Magnifica Comunita, come quella, ch'e anteriore a tutti, siano sempre salve, et eccettuate, e che sia sempre lecito al Commissario, con partecipazione delli Signori Eletti sudetti, in penuria d'acqua, benché non sia iv partizione, vendere dette Canali undici d'Acqua, e in tutto, o in parte, secondo gli parera; havendosi sempre risguardo, che la Citta non patisca, all'arbitrio del Sig Governatore, come di sopra, la qual' Acqua esso Commissario venderà a chi li parera, etiam non sia in partizione; e questo accio la magnifica Comunita possi cavare denari del suo, per fare la spesa, et impresa di mantenere l'acqua a questo Citta; e per rispetto del prezzo il Commissario lo farà, con partecipazione delli Signori Eletti della Citta, li quali si aviseranno per il Commissario, e doppo l'aviso, non si trovando essi Signori essere sol fatte, dove si vende l'acqua, e non avisando il Commissario del loro parere, in tal caso esso Commissario habbi autorità lui solo di fare il prezzo, senza saputa d'essi Signori.

VIII.- E piu vuole Sua Eccell. Che venendo il caso della partizione dell'Acqua, conforme al gli Ordini vecchi di questa Magnifica Citta, che si compartisca fra li rivi legitimi, chiudendo la bocca alli bastardi, e conforme alle loro ragioni, e cavandosi sempre prima fuori le undici Canali d'Acqua di questa Magnifica Comunita, et anche le due Canali, che si solevano dare alli Conti di Lando per la mettura dell'Acqua; e per rispetto della Canale, che si soleva dare al Sig referendario per honoranza, non s'intende di presente fare altra dichiarazione, ma si riserva le ragioni alla Magnifica Comunita, o altri a chi spetta le quali tredici Canali si dispenseranno per beneficio et utile di questa Magnifica Comunita, e cosi il Commissario le venderà a chi li parera e con intervento, come di sopra si e detto delle undici Canali, che le possi vendere prima l'Acqua sia in partizione; et il simile s'intende della sudetta Canale solita darsi al Sig Referendario, in caso sia dichiarato spettare alla Magnifica Comunita; e questo atteso, che la Magnifica Comunita

ha accettato l'utile, et il danno della mettitura dell'Acqua, e di pagar la sua provisione al Commissario.

IX.- E piu Sua Eccellenza dichiara, che quando Acqua sara posta in partizione, e che poi sopravesse un crescente d'Acqua nel Fiume della Trebbia, che si mantenesse, e fosse tale, che si potesse sodisfare alla Magnifica Comunita, et a tutti i Rivi delle loro ragioni dell Acqua che in tal caso non s'habbi da vendere l'acqua, ma che ogni Persona habbi il suo senza pagamento, poiche il Signori Iddio gliela mandata, perche e mente di Sua Eccellenza, che l'acqua, si venda per il Commissario quando e in penuria, sia o non sia in partizione, accio li Particolari non goldano quello, ch'e della Comunita senza premio alcuno e si possa cavare da far la spesa in mantenere l'acqua alla Citta.

X.- E piu inherendo a gli Ordini gia fatti per la Magnifia Comunita di questa Citta, Sua Eccellenza ha ordinato, e comanda che tutti li Padroni delli Rivi, cosi bastardi, come legittimi, e quelli, che hanno ragione di quindesine , o di adacquare in gli altri giorni, di quale stato, o erado siano, etiam che siano Persone Privilegiate, faccino solar di pietre il fondo delle boche delli suoi Rivi, o quindesine, rispettiuamente in modo che il piano non sia piu basso del fondo, e pianto del Rivo Comune, o Piccinino, e che la bocca sia eguale, et attaccata alla Riva, et al piano del Rivo Comune, e Piccinino, e gli mantenghino le sue buone Berline con gli incastri, e con li suoi tormenti, e stelli armati di lastra di ferro, con li suoi buoni Cadenazzi, e Chiave, e gli faccino fare, e mantenghino li suoi bocchelli in una pietra, e faccino accomodare in maniera tale, che non possino capire ne havere se non la sua ragione dell'Acqua, che mostreranno donere havere la Berlina quando sara serrata, e chiavata, le quali Berline si possino alzaarsi, e sbassarsi, e chiavarsi con le Chiavi, secondo l'occorrenza, e conforme all'ordine, che gli sara dato da vu Esperto, che sara deputato dal sig Governatore di questa Citta, e che le Chiavi di dette Berline, che sono sopra la Colonna stiano appresso il Commissario, come quello, che havera il Reggimento dell'Acqua di sopra la Colonna, o di qualche suo Ufficiale che egli deputerà; e le Chiavi delle Berline di sotto la Colonna stiano appresso il Sig Referendario, o suo Ufficiale che li deputerà; Avertendosi , che non saranno scusati li Padroni delli Rivi, che hanno le loro bocche su la ghiara di Trebbia, sotto pretesto, che non possino piantare Berline, ne fabbricar su la ghiara perche in tal caso doveranno solare le bocche delli suoi Rivi, e far le Berline nel modo sudetto, nel luogo dove imboccano l'acqua in terra firma.

XI. – E piu ha ordinato Sua Eccellenza, che niuna Persona possa, ne li sia lecito da se stessa, e di propria autorita, pigliarsi la sua Acqua, ne per tale effetto mettere diano in le bocche delli Rivi, o alle Berline; ma che ogni Persona, etiam Privilegiata, cosi in li giorni di quindesine, o d'honoranza, come in gli altri giorni facci capo dal Commissario, o suoi Ufficiali, che saranno su la ghiara di Trebbia, per rispetto di sopra la Colonna, quali li daranno la sua ragione alla rata dell'Acqua all' arbitrio del Commissario, e per rispetto di sotto la Colonna, al Sig Referendario, o suo Ufficiale, che deputerà, e quale havera cura di dar l'Acqua a suo luogo, e tempo, et aprire, e serrare le Berline in li di de quindesine, conforme a gli Ordini gia fatti per la Magnifica Comunita di questa Citta

XII. – E piu Sua Eccellenza ha ordinato, e comanda, che ogni Persona, cosi Privilegiata, come non Privilegiata fra termine di quindici giorni prossimi avvenire, mostrino e presentino le loro ragioni dell'acque in mano al Sig Governatore a fine possi vedere, e dichiarare la quantita dell'Acqua che doveranno havere, di che poi ne dara notizia al Commissario, accio sappia la ragione di tutti, per sapere come governarsi, e distribuir l'Acqua, e per vedere se haveranno fatto li suoi bocchelli, conforme alle loro ragioni.

XIII. E piu ha ordinato Sua Eccellenza, che nelli di di quindesina o di honoranza l'Acqua sia compartita nelli Rivi all'arbitario del Commissario, accio cadauno Persona, cosi di sotto, come di sopra possi quindesinare, non ostante consuetudine, precrizione, o altra cosa in contrario.

Appendix C – Extended description of di Lodi and Cattaneo

Rutilio di Lodi makes his first appearance in the record in an order from the CSO for 29 July 1585, which mentions him and his mill. Immediately following is a *memoriale* addressed to the Duke from the neighbourhood of San Antonino. In it, the writers make clear that they have done all they were required to do in terms of payment for a channel that ran along the principle street of the neighbourhood. The conditions were dire, they explained, due to flooding, and the canal needed to be cleaned out. The local mill and miller above the Rivo was also involved. They wanted the road and water channel restored in the neighbourhood. That this involved Rutilio is seen in an order issued by the committee on Saturday, 20 March 1589, which referenced Rutilio and urged the millers involved to clean and purge Rivo San Antonino. Another letter from Prince Ranuccio Farnese was inserted into a case that involved Rutilio di Lodi. This letter from 15 July 1590 again referenced the struggle of the residents of the neighbourhood of San Antonino and their desire to see the Rivo cleaned. This is followed by an order from the CSO to Rutilio di Lodi (Laude) on 21 July 1590 to clean out Rivo San Antonino. A *memoriale* to the duke inside a note dated 13 August 1590 originates again from the residents of the neighbourhood. It describes flood damage from Rivo San Lorentio, (San Lorenzo, the name for the Rivo further downstream). The people who lived beside the Rivo complained of fetid garbage and other similar material in the water channel. Much damage had been done to the neighbourhood and to those who lived along the water channel as when the channel was dry, it stunk and when it was full, it flooded. They appealed to the duke to fix the situation. The duke responded with a letter on 26 August 1590 which called for the city to have the work to be done without delay. Another

order was issued by the CSO in September 1590 for Rutilio di Lodi to purge Rivo San Antonino¹.

In this situation it appears that the monies to do the work had been collected as the residents asserted in their first letter of complaint. Since they had paid, the residents expected the work to be done. When it was not they went above the CSO directly to the prince. This might be due to the fact that this was still during the early years of the CSO and full authority had not yet been established, at least in the minds of the residents. They did have some cause to go beyond the CSO, as the work had not been done despite CSO orders to di Lodi to do so. Since Duke Alessandro spent his time at war in Flanders for Spain, his son, Prince Ranuccio I, had to govern the province. Authority may have been confused or unclear. The fact that the residents had to appeal to higher authority could mean that Rutilio di Lodi failed to fulfil the contract between millers and the city or that the CSO failed to follow through and confirm that the work had been completed.

The documents break for a few years but in a letter from 1595, Sig Girolamo Anguissola (a leading noble family) from the Cantone della Stoppa was again concerned about the status of Rivo San Lorenzo and the damaged caused by Sig Rutilio Lodi and his tenant millers. Several orders follow, one for 2 October 1598 was for di Lodi to clean out Rivo San Antonino and a similar one for 1599 and Rivo San Lorenzo. In 1599 di Lodi wrote a *memoriale* that had to do with expenses for Rivo San Lorenzo and the convent Santa Maria della Pace. In it di Lodi cited

¹ In order mentioned: CSO 2-F3-13 order, 3-F3-25, a memoriale from neighbourhood to duke, 3-F3-7 order, 3-F3-25 letter from duke, 3-F3-35 order, 3-F3-26B letter to duke, 3-F3-26A letter from duke, 3-F3-26 order.

obligations agreed upon from 1570 which required a contribution from the convent to clean the canal. Di Lodi explained that he had done what was required to purge Rivo Meridiano².

On 11 December 1599 the CSO issued an order for an inlet in Rivo Meridiano. There had been damage there and maintenance was required. The order cited an agreement from 1559 with Duke Ottavio Farnese to call on di Lodi to do the work. It is hard to know if the work was done, as another order deals with Rivo Meridiano and is dated for 20 February 1601. A *grida* from 8 November 1601 mentions di Lodi, among others, and his obligation to purge Rivo Meridiano below the meat market. Rutilio Tressimi Lodi wrote the CSO on 20 April 1602 to state that he had paid 30 scudi to purge Rivo Meridiano and that it had cost another 25 scudi. He wanted repayment of these substantial sums. However, on 8 June 1602 the committee ordered di Lodi to purge Rivo Meridiano, which means either the work was never done or was considered inadequate. Another order for the same work is dated 6 July 1602. The CSO then had engineer Bolzone submit a report on the situation on 10 August 1602³.

The documents break until 1609. In a document inserted into another, which could be a *memoriale*, the son of Rutilio Lodi is named as a mill owner for a mill near Chiesa Maggiore (the cathedral) below the Monte di Nazaretti which used the water from Rivo Meridiano. There were problems with the neighbours and with the gardeners who needed to irrigate their plots. The letter describes the condition of the Rivo San Antonino and the road from San Agostino as in need of maintenance. The writer requested the CSO to issue an order for the necessary work⁴.

Another similar *memoriale* of complaint was sent to the committee on 27 July 1609. Francesco

² In order mentioned: CSO 2-F3-4 memoriale, 2-F5-15 order, 4-F1-1 order, 4-F1-4 memoriale, 4-F1-6A document.

³ In order mentioned: CSO 4-F1-3 order, 4-F3-3B order, 4-F4-3 grida, 4-F4-1D memoriale, 4-F4-11 order, 4-F4-1E report.

⁴ In order of mention: CSO 5-P1609-11A, 5-P1609-11, 9-F1-29-F1-46, 9-F1-22, 9-F1-24.

Tresini da Lode with his partner Angelo Maria Guatrinime wrote to the committee in 1628 about problems with a channel near the prison that needed repair. The two partners complained about *immonditie* in Rivo Meridiano in another *memoriale* in 1628. The sequence is unclear but the CSO issued an order on 29 April 1628 to purge Rivo Meridiano with Lodi and Guarinone as signatories to the document in an apparent agreement to do the work on the water channel. The partnership was made explicit in an order for 26 May 1628 when the CSO commanded that Sig Franco Lodi of the Duomo and Angelo M Guarinoni of Santa Brigida deal with the earth and rubbish in Rivo Meridiano or face penalties. It appears that the son followed in the father's footsteps when it came to a contentious relationship with the urban management committee.

Woven through all of the orders and *memoriali* are legal cases and lawsuits which involved or mentioned Rutilio di Lodi. While there are a total of 17 orders that mention Rutilio di Lodi and seven *memoriali*, there are also six legal documents that mention him. Di Lodi appears to have been involved directly or indirectly in a substantial amount of litigation. His son, Franco however is quite different. In his case there are seven *memoriali* but only two orders and no legal documents. It appears the son had much interaction with the CSO but none of his father's legal situations.

Andrea Cattaneo

The second miller with a contentious relationship with the CSO was Andrea Cattaneo. He first appears in the record in a note that includes a list of mills from 1639. One of the millers named is cited as connected to a mill that belonged to Cattaneo, a tenant miller. An order from 7 June 1639 for millers to work on the Beverora includes Cattaneo as one of the signing millers. While the interactions between the CSO and Cattaneo grew, they peaked in 1646. In the decade

between 1641 and 1650 Cattaneo is mentioned in 10% of the *memoriali* sent to the committee. In some cases he wrote the letter and in other cases the writers complained about him. His name appears in 13% of the orders issued by the CSO for that decade. And he was involved in around 20% of the legal documents for that period. Overall, out of 304 total documents for that decade Cattaneo is referenced in some way in 34 or 11% of them. The numbers shift dramatically in the year 1646 when out of 76 total documents Cattaneo is named in 18 of them for a total of 24%. The members of the CSO must have felt that they spent much of 1646 in response to issues that concerned Andrea Cattaneo. He is mentioned in *memoriali*, orders, legal documents, and *convocati* from that year.

The sequence for 1646 can be constructed through the documents that are firmly dated. A few *memoriali* lack dates but have been inserted where they appear to make the most sense. The year 1646 for Andrea Cattaneo followed this sequence. It began with an order from the CSO on April 6 for Rivo San Agostino and proceeded with further orders for Rivo Meridiano and Rivo San Siro on 19 April, 9 May, 12 May, 24 May, 28 May, 21 June, 25 August and finally 25 November. Documents from that year also include *memoriali* from Cattaneo to the CSO to explain his failure to accomplish the ordered work and complaints from others about dirt and rubbish left behind on Cattaneo work sites.

Cattaneo had a conflictual relationship with the CSO that predates 1646. In a *memoriale* from 1643 Cattaneo wrote to complain that a problem in front of the Duomo with Rivo San Agostino was not his fault. He claimed that fault lay with the bishop and in fact, Cattaneo's interests had been damaged in the situation. In 1644 he sent a *memoriale* to the CSO about work he had done for the duchess. He had failed to get a license for the work on the grounds that he did not have time to do so. In a *memoriale* dated 13 July 1644, he explained that he had been unable to

complete a purge and excavation of dirt from Rivo Meridiano because of a festival. In that situation, he requested more time. Yet again, in 1644 he wrote the CSO about a problem with Cantone della Stoppa and complained that the problem had little to do with him. It was the fault of those in San Agostino who had impeded the flow of water.

While Cattaneo was quick to submit his complaints, others also complained about him. In 1643 Gasparo Columbo wrote about how he had moved into a home in the neighbourhood of San Antonino only to find a mess left by Cattaneo from excavation. As noted, on 28 May 1646 Nicelli also complained about how Cattaneo had handled the disposal of dirt from canal excavation. It is difficult to determine who exactly is at fault in these situations. Certainly, some of the problems appear to take years to resolve. The millers were to address the drainage in piazza San Antonino in April of 1646, yet at the end of May a flood occurred in the piazza. It is impossible to know if this was due to the failure of the millers to do the work in a timely way, or faulty infrastructure, or an inadequate repair job. And it may have been an unusually high water level that was unanticipated that overwhelmed the existing, correctly built, infrastructure. While the overall relationship between the CSO and Andrea Cattaneo appears contentious it is impossible to know exactly what happened based on these documents alone. No matter where the fault lay, with old and inadequate infrastructure or negligent millers, the CSO and Cattaneo were focused on one another for the better part of a decade. Cattaneo disappears from the record in 1651. The last mention is an order on 10 June 1651 that included Cattaneo and a purge of Rivo San Agostino. For a short while Master Andrea Cattaneo dominated the business of the CSO, and then he was gone.

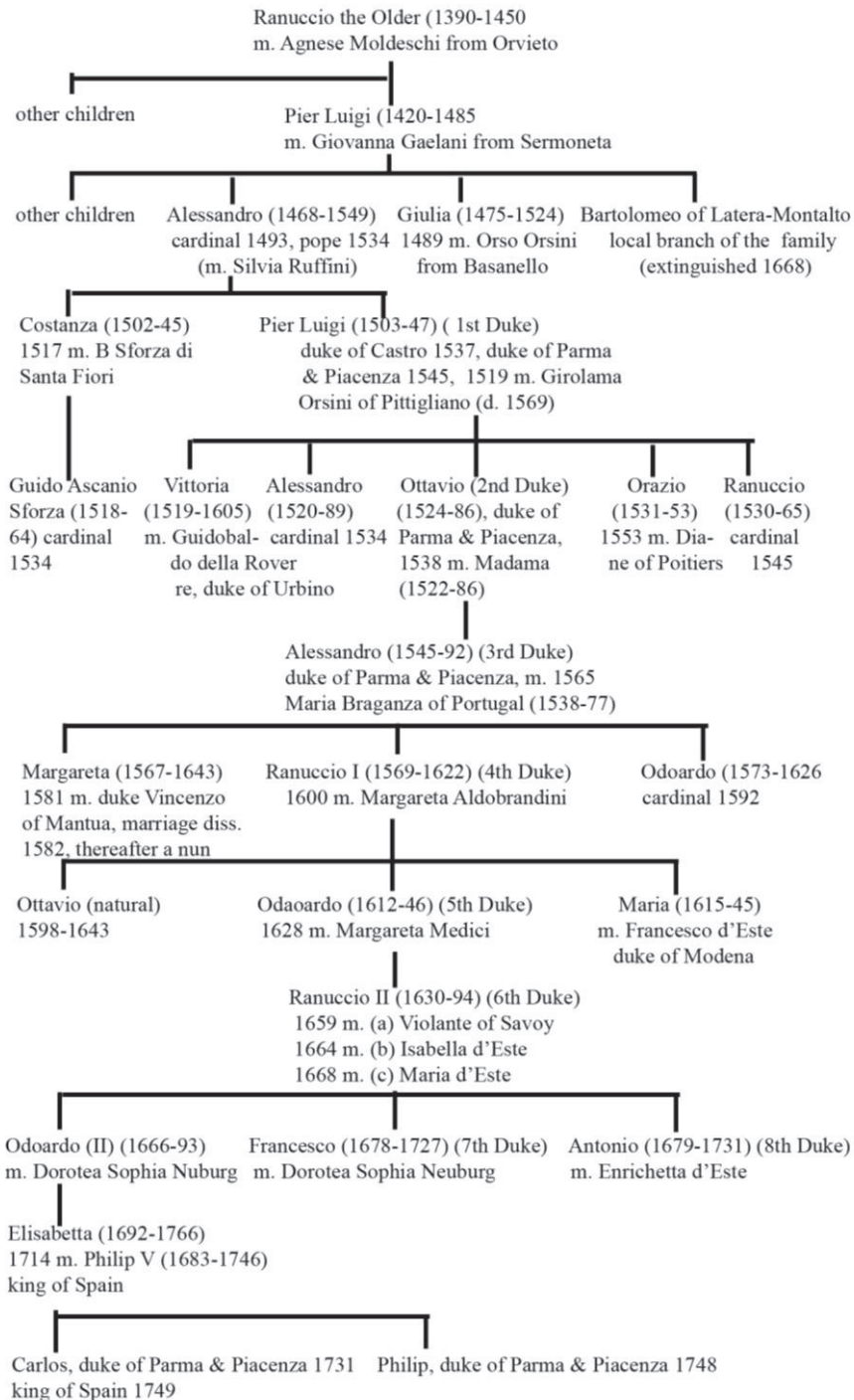
Appendix D – Poli's list of engineers correlated with CSO information

Poli's dates	Professional title	Names	Source	CSO dates	Names
1543	esperto misuratore	Giovan Battista Romano	Provvigioni, registri		
				1559?	Hieronimo Bonadeo
1573	ingegnere comunale	Giovanni del Bruno	Provvigioni, registri		
1577	ingegnere comunale	Alessandro Bolzoni	Rivo Parente cas.2		
1578	ingegnere comunale	Alessandro Bolzoni	Rivo Parente cas.2		
1579	ingegnere comunale	Giovanni del Bruno	Rivo Parente cas.3		
1583	ingegnere comunale	Alessandro Bolzoni	Rivo Parente cas. 3		
				1602	Alessandro Bolzoni
1604	agrimensore pubblico	Gio Maria Cornelli	Rivo Parente cas. 3		
1605	arch. e ing. Comunale	Alessandro Bolzoni	Rivo Parente cas. 3		
				1606	Alessandro Bolzoni
				1606	Paulo Camillo
				1608	Alessandro Bolzoni
				1610	Christoforo Landi - eletto
				1610	Giulio Cesare Trompelli
1610	ingegnere comunale	Alessandro Bolzoni	Rivo Parente cas. 3		
1611	ingegnere comunale	Alessandro Bolzoni	Provvigioni, registri		
1611	ingegnere	Giulio Cesare Trompelli	Provvigioni, registri		
1612	ingegnere comunale	Alessandro Bolzoni	Provvigioni, registri		
1612	ingegnere	Giulio Cesare Trompelli	Provvigioni, registri		
1613	ingegnere	Alessandro Bolzoni	Provvigioni, registri		

Poli's dates	Professional title	Names	Source	CSO dates	Names
1614	ingegnere comunale	Alessandro Bolzoni	Provvisgioni, registri	1614	Alessandro Bolzoni
1614	ingegnere	Gio Guglielmo Ceano	Provvisgioni, registri		
1615	ingegnere e agrimensore	Giulio Cesare Trompelli	Provvisgioni, registri		
1615	ingegnere e agrimensore	Alessandro Bolzoni	Provvisgioni, registri		
1616	ingegnere	Giulio Cesare Trompelli	Provvisgioni, registri	1616	Giulio Cesare Trompelli
1616	ingegnere	Gio Guglielmo Ceano	Provvisgioni, registri		
				1616	Matte Bergamascho
				1616	Bonades, agrimensore
				1617	Deputy Pasquale/Arcelli
				1617	Giulio Cesare Trompelli
1619	ing. Agrimensore pubblico	Giulio Cesare Trompelli	Provvisgioni, registri		
1625	ing. Agrimensore pubblico	Giulio Cesare Trompelli	Rivo Parente cas 3.		
				to 1626	Giulio Cesare Trompelli
				1626	Co: Christoforo Landi
1627		Battista Cornelio	Provvisgioni, registri	1627	Co: Christoforo Landi
1635		Giulio Cesare Trompelli	Acque di Trebbia b. 61		
1635		Battista Cornelio	Acque di Trebbia b. 61		
				1647	Giulio Cesare Trompelli
				1651	Andrea P. Guber et capo, Gaspero Tedesco

Poli's dates	Professional title	Names	Source	CSO dates	Names
				1653	Alessio Cremonese
1658		Alessio Cremonesi			
1658	periti eletti	Gio Maria Gobbi			
1665	agrimensori	Giulio Bassi	Acque di Trebbia b. 78		
1665	agrimensori	Alessio Cremonesi	Acque di Trebbia b.78		
				1667	Alessio Cremonese
				1671	Baratieri
				1671	Alessio Cremonese
1672		Alessio Cremonesi	Rivo Parente cas. 3		
1672		Giuseppe Milani	Rivo Parente cas. 3		
				to 1674	Alessio Cremonese
1675	agrimensore	Giulio Cesare Trompelli	Rivo Parente cas. 4		
1678		Alessio Cremonesi	Rivo Parente cas. 4		
1678		Bartolomeo Calderoni	Rivo Parente cas. 4		
				1683	Giuseppe Cremonese
				1687	Paolo Cerri
				1691	Petro Anto Doria, Deputy
				1694	Paolo Cerri
				1706	Bartolomeo Cremonese
				to 1709	Giuseppe Cremonese
				1709	Giuseppe Bugui
				1725	A(?) Giuseppe Tinetti, Deputy
				to 1731	Bartolomeo Cremonese

Appendix E – Farnese Genealogy



From: Gamrath, Helge. Farnese, Pomp, Power and Politics in Renaissance Italy. (Rome: L'Erma di Bretschneider, 2007) 25.

1. Duke Pier Luigi (ruled 1545-47), the first duke began construction of the new *castello*, initiated the *Congregazione sopra l'ornato*, and was assassinated in Piacenza by four young nobles who were members of the Landi, Anguissola, Pallavicini, and Confalonieri families with imperial connivance. Ferrante Gonzaga, the imperial governor of Milan, then occupied Piacenza and completed the *castello* and fortifications. The imperial Spanish troops stayed on in the citadel to 1585, after the Treaty of Ghent.

2. Duke Ottavio (1547-1586) ruled first from Parma and then over Piacenza after it was returned to him in the Treaty of Ghent in October 1556. He initiated the large scale reforms to the water utility in 1585.

3. Duke Alessandro (1586-1592) was away in Spain or at war in Flanders for most of his life and left the management of Parma and Piacenza to his son Ranuccio.

4. Duke Ranuccio I (1592-1622) is understood to have been superstitious and heavily invested in the church. Giovanna Solari credits him with implementation of laws for the roads, sewage management and the disposal of garbage though this might have been more in Parma than Piacenza.

5. Duke Odoardo (1622 – 1646) inherited the duchy at age ten and was initially under the co-regency of his mother and cardinal uncle. Piacenza became his favorite residence. However he created problems for the city when, during the 30 Years War, he allied with France against Spain and brought conflict to the area in 1636. The residents of Piacenza also had to cope with famine and plague in the decade of the 1630's.

6. Duke Ranuccio II (1646-1694) was known for providing the city with a time of stability and peace.

7. Duke Francesco (1694- 1727) inherited a newly impoverished duchy that demanded more economical living. In 1718 in the Treaty of London, Spain, France, the Dutch Republic, Britain, and Austria agreed to the means of succession when the Farnese line died out.

8. Duke Antonio's (1727-1731) death was followed by a period of confusion in the midst of the impoverishment of the duchy. Finally, Don Carlos (future King Charles III of Spain), the son of Elisabetta, the Farnese wife of King Philip V of Spain, assumed rule according to the treaty.

Austria entered the duchy in 1736 with a role in governance. After this the Bourbon-Parma dynasty was founded by Philip, the brother of King Charles III, who took the title of Duke of Parma and Piacenza in 1748¹.

¹ Information in the genealogy taken from Giovanna Solari, The House of Farnese, 1468-1766, (New York: Doubleday, 1968) and H. Gamrath, Farnese, Pomp, Power and Politics.