Emma Filipponi

A EUROPE OF WATER

NAPOLEONIC PROJECTS FOR PARIS AND PADUA (1797-1814)

AISU Aisu International Associazione Italiana di Storia Urbana

Urban history / Storia urbana 2

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Napoleonic Projects for Paris and Padua (1797-1814)

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Traduzione

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Impaginazione

Luisa Montobbio

ISBN 978-88-31277-01-3
Redazione: gennaio 2023

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Abbreviations

ADPa	Archives de Paris
ANPa	Archives Nationales, Paris
ASPd	Archivio di Stato di Padova
ASVe	Archivio di Stato di Venezia
BIB. COM. ARCH.	Biblioteca Comunale dell'Archiginnasio di Bologna
BIB.E.P.C.	Bibliothèque de l'École Nationale des Ponts et Chaussées, Paris
BAM	Bibliothèque d'Amiens métropole
BNF	Bibliothèque Nationale de France, Paris
BNUS	Bibliothèque Nationale et Universitaire de Strasbourg

Publishing criteria

The modern and contemporary archival documents contained in the Appendix have been catalogued by date and place of publication (year, day, month, place) and are ordered and numbered chronologically. The content of each document has been summarised and transcribed in part or in full according to its importance to the research. All the archival references are at the bottom of the summary and transcription of the document: the name of the archive or library in which they are kept, the name or number (if any) of the collection, the number of the envelope and the date.

The following transcription criteria have been applied:

~~Abcdef~~ → Cancelling in the original
[...] → Omissis
[abcdef] → Incomprehensible words
[*abcdef*] → Author's additions
[*illegible*] → Illegible words

Prize AISU Roberta Morelli, second edition

Donatella Strangio
Member of the AISU board of directors
Full professor of economic history – Sapienza Università di Roma

Emma Filipponi's volume, winner of the AISU prize dedicated to the late Roberta Morelli, full professor of economic history at the University of Tor Vergata and a member of the AISU board of directors since its foundation, fully honors the figure of the scholar and enriches the AISU series dedicated to the most deserving PhD theses.

The Morelli Prize, established by AISU in 2017, has collected an important number of submissions, several of them of great value and among them the work of Emma Filipponi. As a member of the Commission, along with Prof. Francesca Martorano and Prof. Salvatore Adorno, I was able to appreciate this work not only for its value, but also for the richness of its insights, the depth of the subject matter and the maturity of the research based entirely on original archival sources.

Among the fields of study which Roberta Morelli has imbued with her sensitivity of a refined historian, the city occupies a prominent place, investigated in the perspective of economic and social history, seen from unusual points of observation. This multiplicity of ideas and questions has often translated into innovative study interests that have led her to inquire, in particular, the complex relationship between population and resources, especially energy ones; the dynamics of production and their environmental context; last but not least, the city as a form and container of techniques and economies. It is therefore not surprising that Roberta was one of the pillars on which AISU was built.

Scholar Emma Filipponi discusses two particular cities, Padua and Paris, the relationship with their water *réseau* and their transformations over time, within a rich historiographical framework, with precise reference to sources and studies. Filipponi grafts the textual contents to iconographic materials, addressing the analysis of the dynamics from a historical and social perspective, as well as visually and spatially reconstructing the places of the story, through images, maps and plans. The very extensive bibliography and archival references cited constitute a useful working tool that has certainly been made her own by the scholar and presented for possible future comparisons.

The novelty of the work lies in the investigation of four aspects: the analysis of the general relationship between the French Empire and the Kingdom of Italy and their technical and political links; the study of the operations of strengthening of water networks in Padua and Paris, before, during and after the Napoleonic domination; the analysis of the *Navigation Intérieure* projects of France and Italy; the investigation of the connection projects between France and the cities of the North Adriatic region.
The chosen time interval, French domination, then represented a gap on the topic. Filipponi has identified unexpected links between strategic choices in territories, allowing roles and patterns to be hypothesized. A key function was played by the study of multiple and diverse sources: the contextual use of bibliographic ones, substantially updated, of iconographic and of Italian and French ones has opened a wide 'window' on the theme of the relationship between water and the city, reconstructing a clear panorama of events combined with numerous new interpretative insights.
Emma Filipponi's work fits into that path well traced by Roberta Morelli with her "Innumerable landscapes", as we might define her research paths (inspired by the works of Fernand Braudel, whose words are quoted above, are used as the title of a recent collection of essays in his memory)[1] from which young scholars like Emma have been able to draw useful lessons.

[1] Daniela Felisini, Franco Salvatori, Maria Giovanna Stasolla (ed.), *Innumerevoli paesaggi. Scritti di storia economica per Roberta Morelli*, Bari, Cacucci editore, 2013.

«L'historicité des systèmes spatiaux est définie comme le *jeu des actualisations possibles des formes passées d'organisation de l'espace en combinaisons nouvelles*».

Christian Delacroix, *Bernard Lepetit. Carnet de croquis. Sur la connaissance historique* [Annales. Histoire, Sciences Sociales, 57e année, n. 1, 2002], p. 206.

I

Mise à mort and *Mise en place* de l'eau between the 18th and 19th centuries

I.1 Burials, deviations and urban réaménagement

I.1.1 The urban centres of the France of the *Ancien Régime*

The dynamics of economic growth in European cities and the evolution of their transport systems changed radically from the second half of the 18th century onwards. The obsolescence of manufacturing activities, the disappearance of exclusive water rights, the need for new road systems, collective facilities, landscaping and new health and hygiene requirements made it essential to functionally reorganise the major and minor watercourses of Europe's towns and cities.

This 18th and 19th century dualism between «*mise à mort*» [Guillerme 1983, 188] and *mise en place de l'eau* – between burial and deviation on one hand and the conservation and development of waterways on the other – constantly characterised the urban history of the whole of Europe, gradually leading to operations with different outcomes.

France – studded with big cities and littles villages – had to tackle the difficult job of reorganising its water resources as of the second half of the 18th century.

Over the centuries, particularly from 1650 onwards, the French monarchy had implemented a series of important water-related projects to ensure the country's convenient and efficient internal navigability, creating the dense network of natural waterways that were naturally found all over France. For commercial and military reasons, the national water *réseau* had been extensively developed: by about 1760, France was riddled with rivers, regulated tributaries, ports of all sizes, and outflow, connection and supply canals[1].

The issues of managing the maintenance, diversion or burial of existing waterways posed numerous important questions, especially since water had always been one of the focal points of cities, not only in economic and commercial terms, but also politically, culturally and socially[2].

Bordering on the capital region, the north-eastern region of the country had to deal with the relentless advance of scientific progress in the field of hydraulics and the need to manage the historical areas of the towns. Every small and medium-sized town had to cope

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[1] On France's inland navigation projects under the Ancien Régime, see, among others, Eric Szulman's comprehensive contribution of 2014, and the contribution of Guy Lemarchand of 2015. Eric Szulman paints a clear picture of the various projects related to the French national waters, analysing both specific plans – such as the Plan Bertin and Plan Turgot – and the personalities involved, such as Colbert, Vauban, Turgot and the Service des Ponts et Chaussées. For an overview of the relationship between river navigation and ports, see Anne Conchon's important contribution on French ports in the 18th century, contained in the publication recently edited by John Barzman, Jean Pierre Castelain and Eric Wauters in 2014: *L'escale portuaire entre mythes et réalités, de l'Antiquité au XXIe siècle*.

[2] On the issue of political and administrative conflicts linked to the use of waterways and the interaction between the different social forces involved, in medieval and modern Europe, see the essays in the publication edited by Patrick Fournier and Sandrine Lavaud in 2012: *Eaux et conflits dans l'Europe médiévale et moderne*.

not only with the spread and evolution of the concepts of "healthy" and "unhealthy"[3], but also with the hypotheses and methods of reusing the defensive structures built since the Middle Ages.

From the very beginning, questions concerning the re-use of the old moats and fortifications in French towns played a central role. From the end of the seventeenth century, moats filled with water had begun to lose their immediate utility, thanks to the long period of peace guaranteed by the effectiveness of the alliances and political agreements made by the monarchs of the Bourbon dynasty. Having always been used as the primary defence of cities, from the 18th century onwards forts and their abandoned annexes began to be used by free citizens as barnyards, gardens and tree plantations, while the fortifications were transformed into places where people in search of purer, healthier air could going for walks. One such case was the fort of Amiens.

In Beauvais, home of the royal *tapisserie* workshop, part of the ancient walls was used for drying cloth, while Noyon and Soissons were home to plant nurseries. Along the moats and the embankments, various types of activities requiring the use of water, such as butchers' shops in Chartres and shoemakers' workshops in Évreux and Auxerre, flourished.

In the years following this first phase of dismantling the waterways, the height of the walls was reduced in order to obtain good quality stone ashlars for use in the construction of roads, bridges or buildings on the old canal sites. This was the case of the walls of Étampes, which were used as construction material for the road from Paris to Orléans in 1768, and the walls of Beauvais, which were used to reinforce the bridges over the sections of the River Thérain that ran through the city.

It was at the end of the 18th century, partly thanks to advances in medical science, that the city authorities finally eliminated the walls and moats. Between 1780 and 1788, moats and small tributaries in Rouen and Reims were buried, while those in Amiens were reduced to being small *réservoirs* of water for the town[4].

This was the start of one of the most significant urban phenomena in the history of modern cities, which developed from around the first decade of the 1700s until shortly after the Restoration. Work on the burial or diversion of watercourses came to an almost

[3] The concepts of "healthy" and "unhealthy", the birth of which is substantially linked to the reflection on the concept of the city in the modern era, marked the debate on architectural and urban transformation until the middle of the 20th century, involving technicians, jurists, doctors, artists, archaeologists, officials of different orders and degrees, architects and town planners. On this subject, and on the urban impact that the debate had on Italian and European cities, see the fundamental contribution of Guido Zucconi edited in 1989.

[4] For a broad and detailed overview of the conversion and burial of the urban water supply network in the cities of Northern France and the reuse of the old defensive structures, see the essential work of André Guillerme, *Les temps de l'eau*. In the seventh part of the book, Guillerme discusses the dynamics of the "enterrements", 18th-century burials, identifying the existence of a first phase of de-functionalisation and a second phase of burial of moats, 190-221.

complete standstill during the whole of the First Empire and then intensified again in around the 1830s, when cholera epidemics and the growing need for free space for the construction of the railway lines made it necessary to remove almost all the watercourses no longer in use, in favour of more modern transport routes and new systems of underground *réseaux*.

With the simultaneous abandonment of the so-called "*métiers de la rivière*", the waterways finally lost their primary role in urban organisation and, today, in towns like Rouen, Amiens, Reims and Beauvais, only the main river remains, along with small, isolated traces of its tributaries.

The same also happened around the middle of the 18th century in the capital – the productive and industrious Paris. The city had expanded over the centuries, first beyond the confines of the ancient Lutetia and then of the *Cité*, consolidating its position on both sides of the Seine and dividing its urban functions in a defined and rational manner. The source of the great river was in Burgundy and was the backbone of Paris, before flowing into the English Channel. Its only tributary was the Bièvre, to the south of the city, which itself was enriched by the Montreuil, Saint-Germain, Du Bac and Vaugirard tributaries[5].

In 1749, the existence of the Bièvre came under threat: in a memorandum sent to Louis XV, a lawyer named Poiteven du Limon expressly asked the king to preserve the waters of the tributary, which were under threat from a project drawn up by Germain Pichault De La Martinière (1697-1783), chief surgeon and state councillor to Louis XV. De La Martinière had proposed that the sovereign bury the waters of the tributary in order to feed a new canal outside the city [doc. n. 5 of the Documental Appendix], but his project did not go ahead and the Bièvre was only buried in 1829, for other purposes.

However, the episode is a sign of a significant phenomenon: at the time, the idea that the city's historic little canals should be buried or at least diverted was still partly ingrained. Although there was no common plan, where it was considered necessary, their sites were put to new uses: while in the cities of northern France urban canals were effectively "put to death", in Paris, the need to sustain the factories of the *Gobelins* and *Teinturiers* [doc. n. 5 of the Documental Appendix], which drew the energy they needed to process cloth from the waters of the Bièvre, was stronger[6].

In eighteenth-century Paris, even more essential than the supply of new external canals was the need for a good water network: dedicated to use by tradesmen and the transport of goods and people, as well as to the hygiene of the city and the feeding of its inhabitants,

[5] The old open-air Parisian water network was much more complex than the modern, contemporary version. For a clear picture of Paris's water system before burial, see the works of Danielle Chadych and Dominique Leborgne edited in 1999 – *Atlas de Paris. Evolution d'un paysage urbain* – and the work edited in 1960 by Pierre Lavedan: *Histoire de Paris.*

[6] For a more in-depth picture of the industrial vocation linked to the survival of the course of the Bièvre, see, among others, the contribution on the subject made in 2010 by Thomas Le Roux.

the preservation of an efficient network of water made Paris different from other cities in the northern part of The Hexagon and was to be, as we will see, the starting point for the development of the country's waterways under Napoleonic rule and for a new concept of national and international navigation.

I.1.2 The *longue durée* in Italy from the 17th to the 20th century

Northern Italy, from the Kingdom of Sardinia to the Republic of Venice, was also faced with water-related issues in the 18th century. Discussions were held with regard to the functioning and improvement of the existing water system, analysing it both on an urban and a territorial scale. The widespread presence of rivers and watercourses had been one of the fundamental variants in the expansion of urban areas in Italy. The abundance of water and the mostly flat landscape was accompanied by a good tradition of hydraulic works and management of the water system, thanks particularly to drainage and reclamation campaigns that had been carried out in the areas surrounding urban agglomerations for centuries. Defence against flooding had already prompted thoughts about reorganising the water system in Northern Italy since the end of the 16th century and these thoughts led to projects for «*mise à mort*» and *mise en place*.

There was in fact a significant difference between what happened in cities located within the Veneto-Adriatic area and what happened in cities located between Lombardy and Emilia-Romagna. In the former, despite losing its role and supremacy in the economic and transport sectors – and despite being subjected to partial burial operations – water remained a historical element of the urban fabric and became the key instrument for the new planning of the city, landscape, views, promenades and monuments. In Lombardy and Emilia-Romagna, on the other hand, almost all traces of the water network were removed from the surface and water *réseaux* immediately became the foundation of the system of underground canals.

By means of a simple cartographic comparison of the maps of Northern Italy's major cities, it is possible to obtain a picture of the clear distribution of the two different trends. The bigger towns in Emilia-Romagna and Lombardy were subject to major earthworks, diversions and decommissioning. The Veneto-Adriatic area, on the other hand, underwent interventions and operations of both types. In both cases, the works were not carried out in a single solution, at a precise moment or during a specific event, but were implemented at different times, in several stages, sometimes with a gap of centuries between the design and construction phases.

In the Emilia area, the town of Modena had been built around fundamental waterways – the Canal Chiaro, which supplied water, and the Canalino, which ensured its correct outflow – which converged towards the centre. The Modenese waterways began to be buried in the early 17th century, when the city became the capital of the Estense Duchy; work continued until the second half of the 19th century, leaving only the Naviglio to

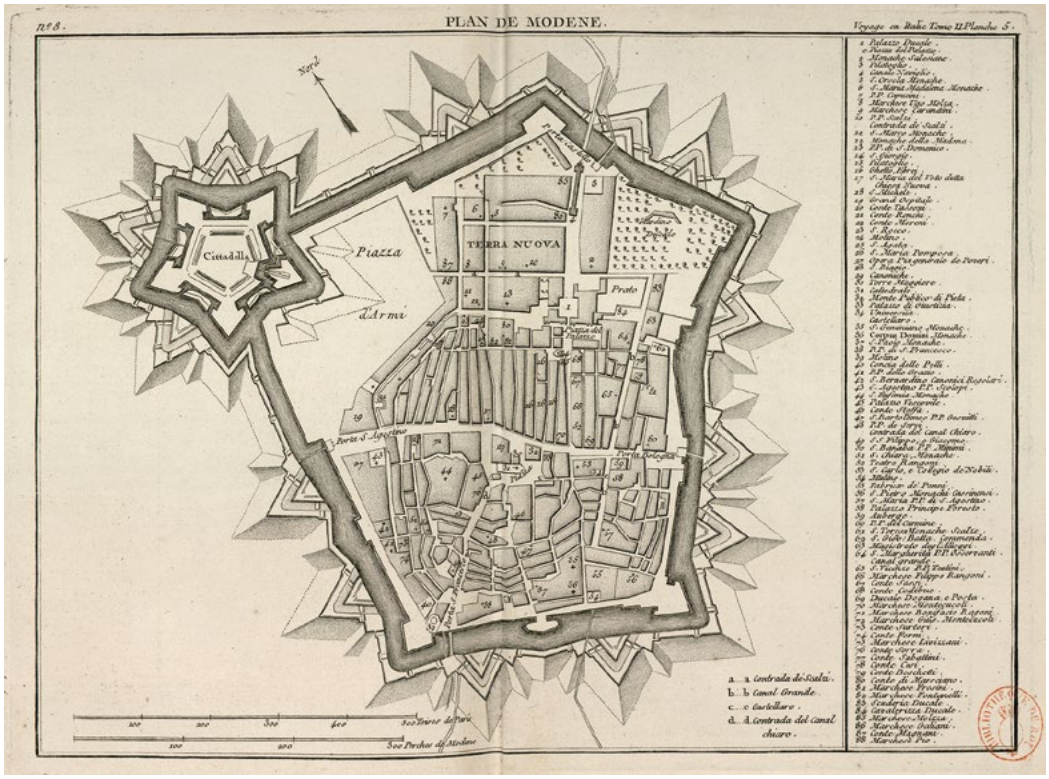

Fig. 1 - Anonymous, *Plan de Modène*, 1768, print [Gallica/BNF].

the north, which provided a link with the Panaro-Po river system, visible (Fig. 1). The presence of water today is practically non-existent: wide streets and avenues have taken rivers and canals out of sight and give us a city in which the memory of water survives only in the city's place names: corso Canal Chiaro, corso Canal Grande, via Canalino.... Not far from Modena, the ancient *Bononia* had managed to divert the waters of rivers located far away from the city centre over the centuries; here too, however, at the beginning of the 18th century, the canals began to be slowly decommissioned, then gradually culverted, becoming the basis of the city's sewage system over the next two centuries. Virtually no trace of the system that enabled Bologna to become one of the largest centres of trade in Northern Italy remains today; again, only the eloquent toponymy (via Riva di Reno, via delle Moline, via del Porto), the little window in via Piella – looking onto one of the few remaining stretches of canal – and the Grada lock give us an idea of the way the city used to be[7].

[7] On the subject of the route of the ancient water network in the city of Bologna, see the contribution edited by Tiziano Costa in 2005. The case of Bologna will be mentioned several times in the course of the narrative to further analyse and explain Napoleon's *modus operandi* in medium-sized Italian cities, especially in relation to the two case studies. The decision was made not to analyse the case of Milan – in

Fig. 2 - Anonymous, *Mappa di Padova e dei suoi corsi d'acqua*, 1760 circa, drawing [ASVe, Savj ed esecutori alle acque, Atti, b.541].

The situation is clearly reversed in the case of Padua. About two hundred years passed between the first proposals to bury some of the city's canals – made in the middle of the eighteenth century by technicians studying flood defence methods – and the partial transformations actually carried out between the end of the nineteenth and the first half of the twentieth century. During these two centuries, numerous projects were presented to extend and strengthen the existing water network: these proposals decreed, particularly for the period from the latter years of the 18th century to the first decade of the 19th century, an absolute hegemony of *mise en place* in the phenomena of water reorganization in Padua, which, apart from some partial burial and deviations, still bears characteristics of a water city, at least in part (Fig. 2).

In France, the difference between «*mise à mort*» (putting to death) and *mise en place* (putting in place) was marked by the greater or lesser importance of the cities, by the succession of epochs – limited to a chronological range of about a hundred years – and by the political and social upheavals that would affect the country. In Italy, on the other hand, where the *longue durée* of the phenomena is much more marked, it was not only

the Napoleonic and post-Napoleonic eras – as its study would require extensive digressions that cannot be made in this narrative context.

the succession of conquests and rulers that conditioned the type of intervention to be planned and implemented, but also the location of the different geographical areas.
In this context, the cases of Paris and Padua are themselves exceptions: in spite of the burial proposals made in the eighteenth century, the French capital rejected burial, proceeding, as we will see, with the design of new canals and inlets. In Padua, despite the flooding problems that had plagued the city for centuries, first the Venetian magistracy and then the French government seemed not to consider the proposals to close and divert the rivers and canals, proceeding with the continuous exploitation of the network: they defended the borders and retraced the perimeters, basically advocating, its absolute utility.

I.1.3 Identity and urban iconography between the 18th and 19th centuries

Within this rather heterogeneous approach to water resources, it is worth analysing the role that water has always played in the dynamics of defining the shape of the city.
As is well known, many European cities were born around a big river or an important branch of a river: over the centuries, urban structures had developed around the main water element and the canals that had been built to facilitate the transport of goods and people and the irrigation of gardens and fields.
Since the Middle Ages, cities in France, Flanders and the Netherlands, along with towns in the Veneto region and the Po Valley, had been affected by long and complicated processes of canalisation of the nearest watercourses, and the guidelines for the expansion of the individual towns and cities had been drawn up in consideration of the presence and layout of the water basins.
In some cases, the layout had changed, as in Toulouse, where it had gone from the quadrangular shape of Roman origin to a semi-circular shape leaning against the Garonne; in towns built at the confluence of two rivers – such as Lyon, between the Rhône and Saône – or on a large bend – as in the case of Verona on the Adige – the central peninsula had retained its ancient layout, while all the successive expansions around it had remained distinct, structured according to the morphology of the water network [Benevolo 2004, 50-55].
In the cities of Northern Europe, the importance of the relationship between the city and water was even more evident: the city of Bruges, for example, had developed around a 9th century castle on the banks of the River Reie, expanding with an elliptical urban geometry, separate from the orthogonal Roman layout. The merchant city strategically exploited the natural inlet of the Gulf of Zwin, creating a new outer harbour and linking it to the River Reie and consequently to the city [Benevolo 2004, 67-68] (Fig. 3).
Padua and Paris were no exception. In Padua – built halfway between two river basins, that of the Brenta, which runs north of the city centre, and that of the Bacchiglione, which runs south – the strict Roman topographical conformation was replaced, from the 10th century onwards, by a more irregular one which, exploiting the abandoned beds

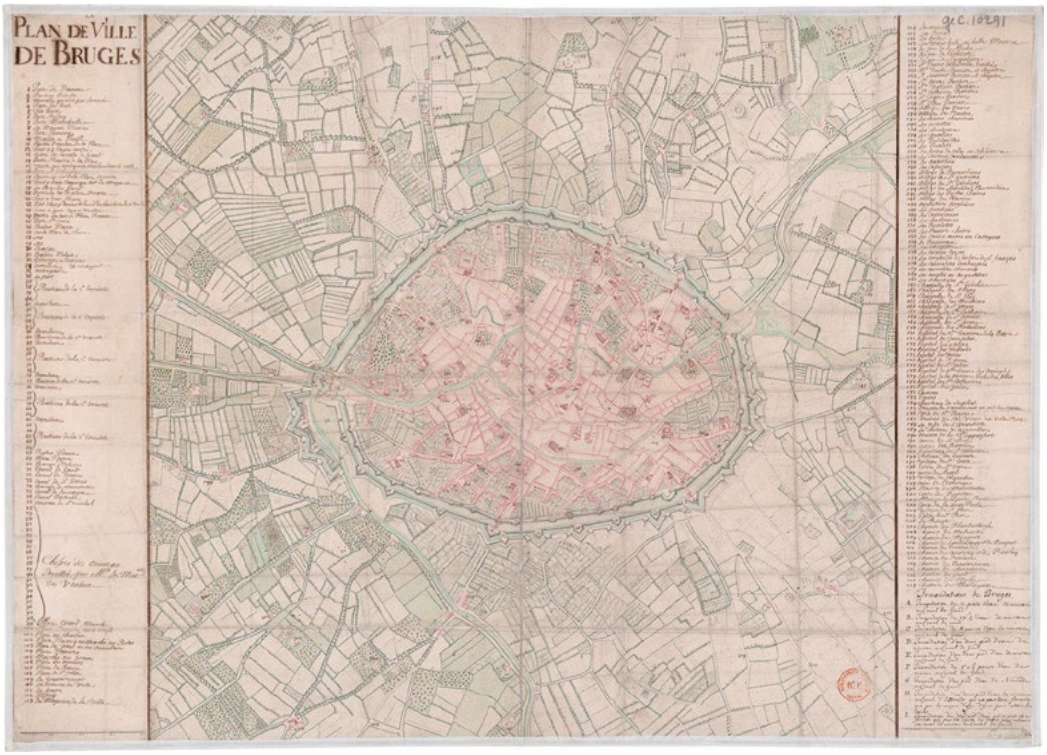

Fig. 3 - Anonymous, *Plan de ville de Bruges*, 1702, drawing [Gallica/BNF].

of the two rivers, wound along the increasingly numerous canals dug to meet transport and commercial needs and to satisfy natural drainage requirements.

In Paris, born at the point where the course of the Seine became more conspicuous thanks to the confluence of the waters of the Marne and the Oise, the natural conformation of the land allowed the city to expand initially on the central island, where the settlements of the first Gallic nucleus, the Parisi, were located, and then on the two banks separated by the river, building a tripartite structure: the commercial area on the right, enlarged first with the construction of the old market – Les Halles – in 1183 and then with the reclamation of the Marais marshes in around 1370; in the centre, the island of the Cité, architecturally characterised by the nearby presence of the centre of power of the Merovingian and Capetian monarchs; along the left bank, in the area occupied by the ancient Roman town of Lutetia, was the site of the Sorbonne University and all the adjoining university facilities[8].

[8] The urban evolution of Paris constitutes one of the most studied topics in European urban historiography today, and analyses have produced numerous publications over the decades. Among others, see two fundamental and historical contributions on the subject, that of Pierre Lavedan of 1977 and that of Marcel Poète edited in 1924.

The operations linked to the transformation of water resources and their harnessing in canals went right to the heart of the cities. They were crucial to the achievement of a threefold objective: they enabled the supply of energy necessary for the flourishing of economic activities such as the textile, paper and milling industries; they contributed to the construction of one of the fundamental components of the city's defence system, in relation to the moat system around the walls and the flood prevention system; they were the basis for modern solutions for the transport of people and, above all, goods. The presence of a more or less developed water network was the preferred indicator of the economic potential of an urban centre on the one hand, and of the degree of technical knowledge of its inhabitants and governors on the other: in big cities, and in smaller ones too, water played the role of a catalyst for the expansion and strengthening of manufacturing activities.

It is clear, therefore, that, as well as being a tangible reflection of technical and economic progress, the water heritage has always represented one of the most important aspects of the history of urban centres, profoundly conditioning the iconography of places over the centuries. As we are told by Donatella Calabi, cities founded around or near a river were considered – and considered themselves – «special» [Calabi 2008, 137], and the shape of the territory surrounding them, born of water and transformed thanks to interaction with it, had very particular features. The presence of an articulate and efficient transport and water supply network conveyed the prestigious identity of water city, which was emphasised by the graphic and pictorial rendering of the iconography of the places.

Especially when created by northern European artists, the urban landscape paintings of the early 19th century almost always reserved a prominent role for water as a fundamental element in the portrayal of the *forma urbis*. Often, the presence and image of a river were linked to that of fortress walls, a lively market and a big bridge with shops [Calabi 2008, 85-89]: one such case was the Pont Neuf in Paris, and the Rialto Bridge in Venice and Ponte Vecchio in Florence still exist. The existence of riverbanks, canals and moats gave the towns a distinctive typological character, which fuelled the imagination of landscapists, painters and engravers of all periods, engaged in developing the iconographic features of these *petites Venises* (Fig. 4). In their works, the facades of buildings huddle together along the canals, boats move between the bridges, laden with goods and people, warehouses, mills and factories line the quaysides.

Among others, Nicolas Chapuy (1790-1858) distinguished himself at the beginning of the 19th century as one of the most fertile iconographers of water cities. In *Vue latérale de la Cathédrale d'Amiens* (Fig. 5), the cathedral, which is apparently the focus of the etching, appears only in the background. In reality, the whole image is skilfully constructed around the representation of the city's riverbanks, the design of the buildings and trees that overlook them, the wake of the boats gliding slowly along the Somme. In *Vue de la Cathédrale de Colmar, côté du Nord*, created by Louis Villeneuve (1796-1842) and Chapuy, (Fig. 6) it is the mill wheel on the Lauch – a branch of the River

Fig. 4 - Anonymous, *Venedig in Colmar, Venise à Colmar*, 1904, photographic reproduction [private collection].

Fig. 5 - Nicolas Marie Joseph Chapuy, *Vue latérale de la cathédrale d'Amiens*, first half of the 19th century, print [BAM, V. Am. 136].

Fig. 6 - Nicolas Marie Joseph Chapuy and Jules Louis Frédéric Villeneuve, *Vue de la Cathédrale de Colmar, côté du Nord*, 1828, print [BNUS, coll. et photogr.].

Ill – that sets the rhythm of the depiction: the roar of the water moved by its blades is accompanied by the movement of women doing their laundry, the voices of vendors and customers among the little market stalls are complemented by the gestures of passers-by, as they lazily glance at the ripples on the water.

This representational method, which borrowed much from the Romantic cultural climate and the taste for the Picturesque, gradually became an integral part of the character of the cities themselves, sometimes going so far as to condition their morphology, balance and general organisation. It is clear, therefore, that when the 19th century plans for the intensive reorganisation of some of the city's water networks began to take shape, when the complete burial or diversion of the historical canals loomed on the horizon, the very definition of the water city and its identity were seriously questioned. The presence of one or more big rivers, the ease of water supply, the speed of transport of goods and people were all typical features of the "golden age" of modern cities. A radical transformation of the water supply system would therefore have posed the risk of losing the historical identity of individual cities and the imprint of their technical, commercial and economic progress.

This is why the iconographic production of the 18th and 19th centuries can be likened to a series of "stills" of urban structures, in which the strength of the river space in the constitution of the urban identity [Backouche 2000, 17] was made absolutely explicit.

I.2 A functional and strategic heritage of cities: conservation and strengthening of the water networks

I.2.1 French cities between the Bourbons and the Revolution

In Paris, the presence of a waterway like the Seine generated an urban space with complex characteristics: in addition to its role in the distribution of civic space, in the division of functions and in the arrangement of the different social classes in the area, the river was an indispensable element in the management of transport and all those trades linked to the exploitation of water. «In an urban world dominated by the river» [Backouche 2000, 57, translation of the author] many activities related to industry and trade were located on the riverside, using the bridges as places for the different types of processing of raw materials.

In the 17th century, Paris's Grande Boucherie and Écorcherie – the public slaughterhouse and the area where animal skins were recovered respectively – were situated in front of the fortress of the Grand Châtelet, now Place du Châtelet. Upstream of the area, towards the Pont Notre-Dame, on the right side of the river, were the tanneries, the *tanneurs*. Due to the level of pollution caused by the processes, the workshops of the *mégissiers*, who worked exclusively with sheep and goat hides, were located further south, along that part of the riverside now known as quai de la Mégisserie. Lastly, the *peaux à poil*, those hides tanned without removing the animal's hair, were processed on the opposite bank, in the area of the Île de la Cité between the Pont au Change and the Pont Notre-Dame. This same area of the Île de la Cité subsequently became home to the workshops and homes of the *teinturiers*, the dyers, and continued to be a site of industrial activity until the end of the 18th century, even after the general abandonment of trades linked to the exploitation of water. Despite being threatened with expulsion in 1786 [Backouche 2000, 61], the dyers, who had their workshops on the ground floor and lived on the upper floors of the same buildings, continued to consolidate the relationship between people and the river, between their crafts and urban morphology.

Besides being a privileged location for some of the most profitable economic activities, the Seine was also a means of distributing and selling products which arrived by river: its role as a vehicle triggered privileged relations between specific areas of the river and different points in the city, based on the varying costs of transport routes and storage.

As early as 1720, a police ordinance had divided the city into areas longitudinal and parallel to the river, each with different transport tariffs: the cost was minimal in the areas immediately closest to the Seine and increased progressively towards the *faubourgs*. As well as reinforcing the differences between central and peripheral areas, this tariff system favoured commercial and economic exchanges along the river.

The directions of connection between the places used for storage and those where the goods changed considerably at the end of the 18th century: to counteract the breaches committed by coal distributors, another ordinance issued in 1785 defined additional delivery areas, which included the areas around the various raw material arrival ports. Triggering a radial movement around Port Saint-Paul, Quai Saint-Bernard, Port Saint-Nicolas, Quai Malaquais and Quai de la Grenouillère, the transporters moved from one side of the Seine to the other and, by crossing the bridges, sewed up the historical rift between different parts of the same city.

Compared to the situation created in 1720, the 1785 tariffs created a new economic geography, which was no longer limited to separating the banks of the river from the *faubourgs*: by reinforcing the penetration of the city by goods arriving by water, transversal – rather than longitudinal – relations between areas of the urban centre and the ports were favoured, dematerialising the physical concept of a city divided by water and interpreting the relationship between Paris and its river in a more functional way.

Far from the capital, Lyon, an outpost of the French crown's business with Italian and Swiss merchants and bankers, had a very different river structure. Built right at the confluence of the Rhône, which flows from Switzerland into the Mediterranean through the Camargue, and the Saône – which flows down from the Vosges department for around 500 kilometres to the border with Auvergne – the city is only about 60 kilometres from the Loire.

The urban layout consisted of a peninsula at the confluence of the two rivers, the Presqu'Île, located at the foot of the Croix-Rousse hill and a central trading post at the time of Roman *Lugdunum*. Two other neighbourhoods developed on the two lateral banks, Part-Dieu to the east and Vieux Lyon, the area where the first medieval and then Renaissance citadel was built, to the west (Fig. 7)[9].

Tripartite like the capital city Lutetia, but nestled between the loops of the Rhône and the Saône, Lyon was, in modern times, what Anne Conchon described as a «*carrefour fluvial*» (fluvial crossroads) [Conchon 2008, 209]. During the 18th century, the Rhône was one of the most dynamic commercial arteries in the Kingdom and, thanks also to the presence of the Saône, the city was not only a place of exchange, but also of load shedding on transport lines.

It was in Lyon that goods used to stop over and pay various tolls: the construction of special dams to direct the currents towards the banks made it easier to board boats on the quaysides [Conchon 2014, 118]. Once the goods had been stored and cleared

[9] The ancient history of Lyon has been the subject of numerous more or less recent studies. Due to the extent of the chronology covered (from prehistory to 900 AD) and the completeness of the information provided, one of the best sources is undoubtedly the volume *Histoire de la ville de Lyon*, published by Jean-Baptiste Monfalcon in 1851 at the Perrin printing house in Lyon, see in Bibliography of Sources Monfalcon, J. B. (1851).

Fig. 7 - Lucas Schnitzer, *Vue de Lyon*, 1666, print [Gallica/BNF].

through the customs of Île-Barbe, they could be re-embarked on the Loire, following a short road trip, or continue southwards towards Arles and the Camargue: the city had become a hub for land and water transport.

It was essentially on river transport and the transport of goods within the country and across the border that the old town had founded its entire economy: not only valuable products such as silk and rich textiles sold at the famous Lyon fairs, but also flour, wood, wine and tobacco made the town's fortune.

Thanks to the navigation of the rivers, the city received wheat from Burgundy and Franche-Comté and oil, tobacco, salt and excellent wine from the Languedoc and Provence. The Saône transported other raw materials: in addition to wine, the river brought freshwater fish to the city – used to feed the city's reservoirs – timber, small bundles of wood for burning, straw, hay and also some building materials.

With this system, urban supply – both in terms of the livelihood of citizens and in terms of increasing the volume of trade and economic flows – was efficient and profitable.

This functional national node of river circulation was further strengthened in 1780 with the construction of an artificial canal that would connect the town of Givors, about twenty kilometres south of Lyon and crossed by the Rhône, to the small town of Rive-de-Gier, 40 kilometres west and the main supplier of wood and coal to the capital. In

addition to this important diversion, the city would benefit from new and broader commercial prospects thanks to the construction, proposed in the 18th century, of a direct link between the Rhône and the Rhine [doc. n. 58 of the Documental Appendix] [10]: only the section of this ambitious project linking the Saône with the River Doubs, at Chalon-sur-Saône, was ever realised [11].

At the end of the 18th century, the river navigation network of ancient *Lugdunum* was upgraded with the construction of the Canal du Centre, linking the Saône to the Loire from east to west: this new link, which exploited the course of the Rhône and that of the Canal de Briare, would make it possible to speed up and facilitate connections between Lyon and the capital [doc. n. 58 of the Documental Appendix]. Obviously, Lyon played a dual role in river traffic, both as a point of arrival for goods and as a centre for river exchanges with the Saône, Loire and Marne, making it a river redistribution hub.

This made the city of the Rhône-Alpes one of the country's main centres, both on national and European scale: André Clapasson (1708-1770), a famous notable of Lyon in the 18th century, wrote in his famous *Description de le ville de Lyon* that

> *le plus grand avantage que Lyon ait tiré de sa situation, c'est qu'elle lui est en partie redevable de son commerce: C'est elle qui lui procure au moyen de ses deux rivières la communication de presque toutes les provinces du Royaume et des pays étrangers. La Saône qui se joint au Doux lui ouvre la Bourgogne et la Franche-Comté d'où l'on gagne aisément par terre, l'Alsace, la Champagne et la Lorraine. Par le Rhône, Lyon communique à la Méditerranée, et par conséquent à l'Espagne, l'Italie et tout le Levant; et à l'égard du Royaume, avec le Dauphine, la Provence et le Languedoc. Le voisinage de la Suisse, de la Savoie et de Genève lui donne une grande facilité de commercer non seulement avec ces États, mais aussi avec une grande partie de l'Allemagne, le Piedmont et le Milanais* [Clapasson 1741, X].

Clapasson's words make it clear that, in the 18th century, the physical crossroads between the land route and the navigable waterway was, particularly due to the possibility of connecting with the rest of the world, an essential prerequisite for a town's economic growth.

In this context of strong dependence on water, any operation carried out on water would inevitably have affected the entire urban structure. At the end of the 18th century, in the climate of operational ambiguity between «*mise à mort*» and *mise en place de l'eau*, Paris – which had already opted to keep the course of the Seine's only tributary, the Bièvre, intact – came up with another design proposal: instead of burying part of the water network, the idea was to increase the distribution efficiency of the Seine and improve navigation conditions in the city, which had always been extremely difficult.

[10] In the 1820s, the project to link the Rhone to the Rhine was still described as a «canal under construction»: see in Bibliography of Sources Fargès-Méricourt, P.J. (1825), 206.

[11] For a broader and more detailed picture of the relationship between Lyon and its two rivers, the volume of traffic passing through them and the general economy of the city, see the texte edited by Anne Conchon in 2008.

Since the beginning of the 17th century, there had been several proposals on the subject, none of which had ever been realised: the first, in 1611, was that of the entrepreneur Cosnier, who proposed the creation of a twenty-metre wide canal, with locks and six ports; its course would have bypassed the fortifications to the north of the capital, linking the Arsenal to the Tuileries, following the trajectory of the walls built at the end of the 14th century by Charles V.

In around 1629, two more projects emerged: the first proposed the construction of an enclosure canal made up of two confluent branches, the Canal de Chaillot, which would run along what is now rue de Provence, and the Canal de Saint-Louis, a feeder canal diverted from the Marne. The other project, developed by the engineer Pierre Hanecart, involved digging a canal from the Arsenal past the Tuileries to the Chaillot Hill.

In 1637, the digging of a simple bypass canal from the Arsenal to Chaillot was proposed and, in the same year, a project for a watershed canal from the Arsenal to Saint-Denis was also presented: fed by a basin to the north, it would be the supply canal for another basin located between the Hôpital Saint-Louis and the Faubourg Saint-Martin. This project was taken up in 1658 by Noblet and Petit, who were Maître des Fontaines de la Ville de Paris and Superintendent of Fortifications respectively [Pinon 1987, 20].

While walls and moats were being dismantled in the north, discussions in Paris focused increasingly on the poor flow rate of the Seine: the waters of the main river were insufficient to meet the water requirements of the various parts of the city, and it was becoming progressively harder to navigate due to the presence of dips and emerging rocks. One of the most famous of these was the *nœud de l'aiguillette*, a limestone bank located between Cours la Reine and Chaillot Hill, which Pierre Patte proposed to demolish in the mid-18th century [Pinon 1987, 16].

As well as supplying water when the level of the river was low, and providing drainage when it was high, efforts had also been made over the years to solve the problem of traffic jams caused by the arrival of goods from the north, by finding a solution that would lighten the load on the Seine and make it possible to bypass the so-called Parisian chain [Pinon 1987, 19]. Following the topography of the site, the water drainage lines and the city's strategic nodes, two main solutions were proposed: one followed the east-west axis, linking the Arsenal to Chaillot as a fortified canal or a diversion from the Seine; the other proposal was for a canal running north-south, from Saint-Denis to the Arsenal, imagined as a watershed canal for a basin or a simple ramification from the north.

This is why, in the early decades of the 18th century, an ambitious plan was presented for the construction of a new canal parallel to the Seine: the new branch would serve both to increase the supply to the river and to create an alternative route to the traditional navigation along the main river.

The project for the new canal was presented by Boisson, the King's engineer, in 1729, and partly resumed previous projects: more than 50 metres wide, the canal included two

sets of locks and its main purpose was to supply the city with another branch of water, which would also serve the areas furthest from the Seine. The new canal, which followed a course very similar to that of the old Seine, diverted part of the waters of the main river at the former jardin des Célestins, on what is now boulevard Henri IV; it then ran past the Bastille and boulevard Filles du Calvaire to today's place de la République. From there, it continued along the current Grands Boulevards to flow back into the Seine at the cours La Reine on the Champs-Elysées (Fig. 8). It was about 1200 metres long and its course was regulated by ten hydraulic machines, positioned between the Faubourg Saint-Honoré and the Elysée gardens. In this way, Boisson conveyed «une tout autre ampleur au détournement de la navigation Parisienne» [Backouche 2000, 188]: all the roads that overlooked the planned course of the canal would be extended with a bridge, accompanied by the installation of drinking troughs for animals.

It was undoubtedly a very articulate idea: the complexity of the structure and the functionality of the project clearly illustrate how modern Paris conceived water transport – by river or canal – as the main and most convenient means of transport, both on an urban and territorial scale.

From a commercial point of view, the creation of a canal like that designed by Boisson would have helped greatly to alleviate the pressure on the course of the Seine: with its extension and the presence of buildings and warehouses alongside it, the canal would play the role of a new urban port and would support the expansion of the capital's river

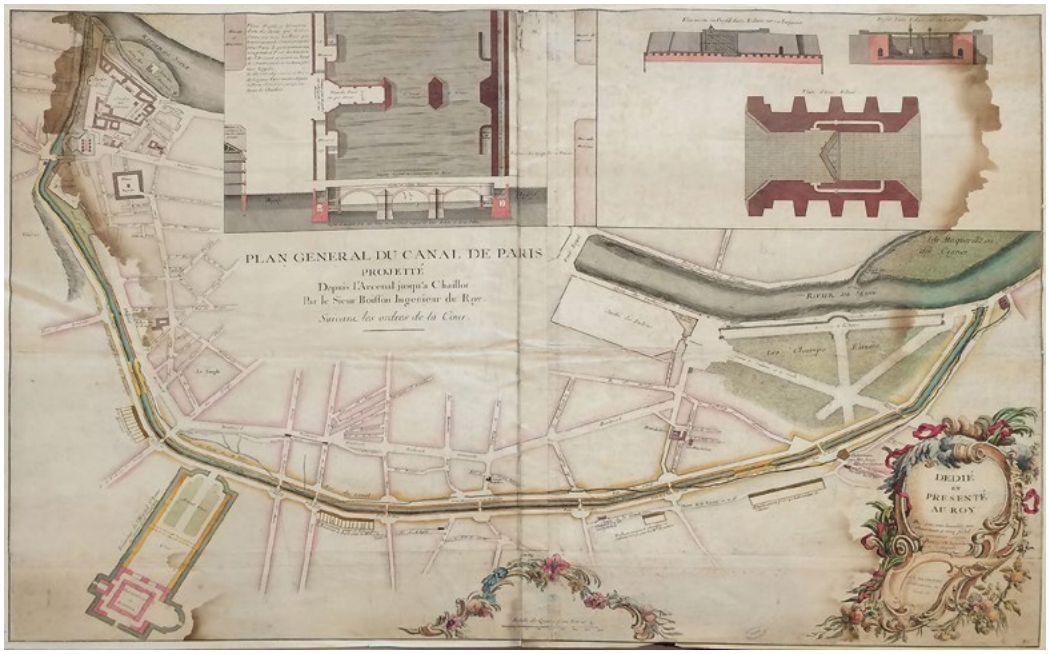

Fig. 8 - Boisson, *Plan Général du Canal de Paris depuis l'Arsenal jusqu'à Chaillot*, 1729, print [ANFr, F/14 Travaux Publics, c. 10117/A].

trade. In addition to its economic value, the new canal would also be important on a strictly urban level: the creation of the new branch on the east-west axis would introduce a major change of scale in the river transport system, as its course was conceived as an interchange space on different levels. In addition to the system of locks, the route of the canal was lined with industrial establishments – mainly tanneries and dyers' houses – and numerous shelters for boats in the event of breakdowns [Backouche 2000, 189].
The impact of a new canal on the capital's structure also had to be measured in social terms: the new route would impose the expulsion from the city centre of certain activities – such as slaughterhouses, foundries, dye works – considered undesirable in residential areas and traditionally located on the riverside. This is why the engineer specified on the map that these activities would all be located on the *côté faubourgs*.
The new canal designed by Boisson remained on paper, but direct analysis of the project allows us to focus on the technical, economic, physical and urban characteristics of the phenomenon of *mise en place de l'eau* in modern times.
It is essential to clarify how the creation of a new canal, according to Boisson's project, would have called for a new organisation and a new distribution of activities and functions within the Parisian urban system. In addition to their economic, commercial and transport value, the presence of waterways organised as interchange areas would have favoured the spontaneous development of new urban spaces, characterised by the activities that would take place there and the social classes that would live there. In this way, the new branch would not only feed the flow of the main river, boost commercial possibilities, supply remote neighbourhoods and distribute public functions, but would also become, in a strictly social sense, a new urban boundary, a new area for development.

I.2.2 An efficient water network: factories, goods and people in Northern Italian cities

For centuries, having an efficient water system which was not too expensive to maintain was one of the *atout* of every European city aspiring to play a commercial role. The presence and morphology of the river depended not only on the evolution of the shape of the city and the location of its urban functions, but also on the urban canals, which were essential for the transport, supply and operation of the machinery needed for manufacturing and milling activities.
In this context, with the extensive canalisation of the Reno and Savena rivers and the creation of the Navile canal to connect with Ferrara and the Adriatic, the aforementioned case of Bologna – close to Padua, but radically different in morphological terms – is a prime example. Despite being located in a very fertile area – linked to the Adriatic to the east, limited by the Panaro to the west and veined from north to south by the numerous branches of the River Po – the city in Emilia was actually rather distant from the two main waterways: the Reno, to the west and the Savena, to the east of the city.

On this subject, Francesca Bocchi writes that a natural river has never passed through Bologna, supplying it with water for domestic and industrial use [Bocchi 2008, 23] [12].
Thanks to long and complex diversion and channelling operations, in the 12th century, during the communal period, the two rivers were channelled: while the Savena was used to feed the city's large moats, only manufacturing activities flourished along the course of the Reno.
Since the presence of a complex water network would have guaranteed quicker connections with neighbouring towns and with the sea, the Navile canal was created to link the Savena and Reno canals and to connect Ferrara and the Adriatic. The western, northern and eastern sides of the city were therefore surrounded by a network of canals which guaranteed defence, energy for milling activities and easy transport of goods and people.
Although often hidden in the cellars of the factories, Bologna had the largest urban concentration of water wheels for manufacturing purposes and the local silk factory remained active throughout the 16th century, guaranteeing high levels of employment and productivity until the end of the 17th century [13], when the city had already been included in the territories of the Papal State.
Thanks to this cutting-edge water system, Bologna was an unparalleled production site: a flourishing centre for craftsmanship, with more than a hundred silk mills [Mocarelli 2008, 203], where the system of canals in the city was the main tool for satisfying transport, commercial, defensive and production needs (Fig. 9). Despite its specificity, Bologna was not the only city on the plain to establish such a strong relationship with its waterways.
Also located in the middle of the plain, Padua boasted an articulate water network, obtained by diverting the waters of the Brenta and Bacchiglione rivers from around the year 1100. After the fall of the Roman Empire and the descent of the Barbarians into the Italian peninsula, the Padua area underwent a radical change in its hydrographic network. The Adige, which had abandoned its course near Este, redirecting its flow further south, and the Bacchiglione, which had moved further north, to the outskirts of the city, had occupied an abandoned bed of the Brenta – the ancient *Medoacus* – which had meanwhile curved further north [Bonarrigo 1992, 53].
The city centre, a compact *insula* ringed by two branches of water arranged in a "horseshoe" shape, has always represented the particularity of Padua's *forma urbis*. The water used to fill the moat was guaranteed partly by the albeit meagre course of the River Bacchiglione [Pili 1987, 156], which forked and entered the city from the south. Thanks

[12] For a broader picture of the Bolognese water system and its use for manufacturing and crafting activities see the contributions edited by Francesca Bocchi in 2001, Alberto Guenzi in 1993 and 1994, and Angelo Zanotti in 2000.

[13] On the development of Bolognese manufacturing activities linked to water, and particularly on the processing of silk in the city's factories, see the contributions edited by Carlo Poni in 2009, and Cesare Maffioli and Carlo Poni in 2003.

to the construction of an artificial stretch, extending from the Bassanello to the Specola, part of the river divided into two branches which, together, formed a ring. The supply system was completed by water from the Piovego canal, which brought part of the waters of the Brenta into the city from the east (Fig. 10).

The two navigable trunks surrounding the historic centre – co-ordinated via other canalisations to various points of the moats, and from there to the main rivers – united the water supplies of the two rivers into a single network [Zucconi 2001, 20] and their presence made it possible for both the mode and frequency of water transport to become quite advanced. In order to ensure a high level of craftsmanship and the smooth and safe movement of goods and people over the centuries, Padua needed a constantly and properly maintained water network.

With this in mind, at the end of the fifteenth century – with the mills fully up and running and goods to be stored in the city and diverted elsewhere – the Paduan government, which depended on the Republic of Venice, started by addressing the

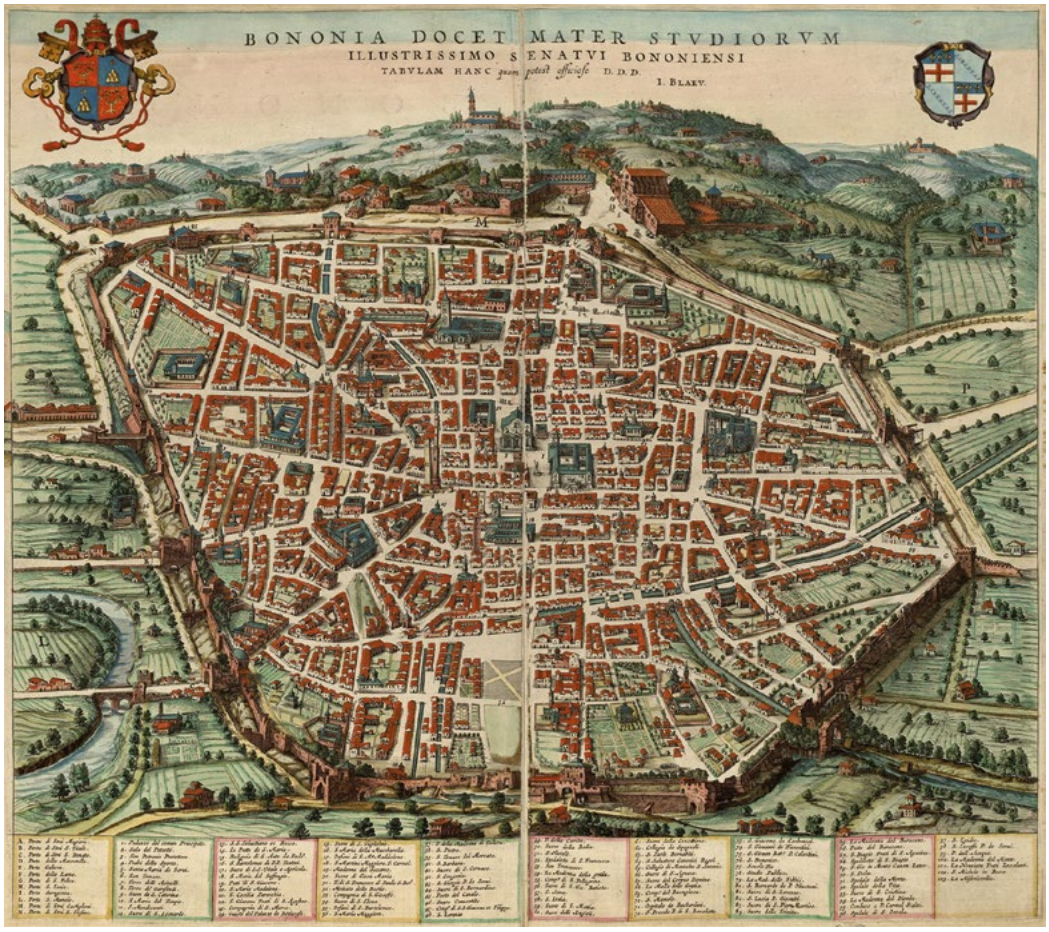

Fig. 9 - Joan Blaeu, *Bononia docet mater studiorum*, 1663, print [BIB.COM. ARCH.].

Fig. 10 - Anonymous, *Padoue*, 1710 circa, print [private collection].

problem of the connection with the Doge's city, rectifying the "jump" that the waters of the Piovego had to overcome as they entered the city from the north, in the area between Porciglia and Codalonga.

The presence and activity of the numerous neighbouring mills (those of Ponte Molino) constantly lowered the water level of the canal and made crossing the Naviglio slow, difficult and unsafe. In 1523, after many years, numerous requests, pleas and injunctions, the decision was made to solve the problem by further excavating the inner Naviglio and building a lock with gates, which became known, as we will see later, as Porte Contarine.

The presence of water in the city had both an economic and defensive function, ensuring that Padua not only exploited the energy produced by the mills, but also the efficiency of a fast and safe transport network, both on the north-south and east-west axes, and guaranteeing the city a central role in the economy of the Venetian territories.

II

For a water-based Europe: the projects, technicians and operating models of Bonaparte's France

II.1 New canals for Paris: a decade-long debate on the city's water supply

II.1.1 *La plus belle des capitales*

With the collapse of the *Ancien Régime,* and after the transition into the political and cultural climate of the Revolution, Paris was preparing to recapture the splendour of a great capital.

At the beginning of the 19th century the city was inhabited by around 500,000 people, preceded by London, which had a million inhabitants, and followed by Vienna and Moscow. Despite the presence of a number of important centres, Paris had not yet fully achieved the status of industrial city [Lavedan 1977, 68].

In order to compete with the other great European cities – and become, as desired by emperor Bonaparte, the «capitale de l'Univers» [Lentz 2015, 10] – Paris would have had to undertake a series of construction and urban transformations, which would not only have changed its morphology and organisation, but would have aimed to make it both a monumental and functional city.

It should be noted that some of the ambitious projects planned at the beginning of the nineteenth century – such as the link between the Louvre and the Tuileries and the construction of the King of Rome's palace on Chaillot Hill – never came to fruition: with the fall of the First Empire and Napoleon's exile on St. Helena, Paris was once again faced with the age-old problems of supply and health. In spite of this, and even if, as pointed out by Jean Tulard, it was not until the arrival of Napoleon III that Paris managed to break definitively with the 18th-century model of the city [Tulard 2015, 7], the urban layout underwent a series of changes that were essential to its modernisation, the outlines of which had almost certainly already been drawn up before 1814 [Sarmant, Meunier 2015, 16].

After the brief period of the Directory, and with the coup of 18 Brumaire, General Bonaparte established an intermediate phase of power, directly inspired by the history of the Roman Empire and known as the Consulate. The role of the Consulate, the regulations of which gave Napoleon's first consul extensive powers for a long period of time, was basically to strengthen the country with a series of political, economic and fiscal initiatives and to reorganise society along modern lines. By rebuilding the foundations of the law and monitoring – and framing – religious power, Bonaparte, having returned to France after the Egyptian and Syrian Campaigns, felt he could act effectively to rebuild the new national identity, which had been completely subverted by the collapse and destruction of the Ancien Régime society[1].

[1] For an in-depth picture of the historical events that followed the establishment of a new political order in France, and for a clear overview of Bonaparte's role in the Consulate, see fundamental contributions

After being appointed Consul for life in 1802, Bonaparte was proclaimed emperor by the Senate on 18 May 1804. In December of the same year, he and his wife Josephine of Beauharnais were crowned by Pope Pius VII in the Cathedral of Notre-Dame. On the strength of Bonaparte's ambitions and military strategies, the French Empire expanded its borders across the European continent to include almost the whole of Italy. As we know, with the exception of Sicily and Sardinia, which retained relatively autonomous institutions, the peninsula was divided into three large parts, all dependent on the Empire. The Piedmont region and those along the Tyrrhenian coast as far as Rome were organised into fourteen departments, directly annexed to the imperial territory: known in official documents as Pays Annexés[2], they became the so-called French Departments of Italy.
The eastern part of the peninsula – from Lombardy to the province of Ascoli Piceno, via the Adriatic regions – was divided into twenty-four departments, which made up the territory of the newly created Kingdom of Italy. Founded in 1805, the Kingdom was governed by a viceroy – a role that was entrusted to Bonaparte's stepson, Eugène de Beauharnais – and although it was formally run by two governmental blocs divided between Milan and Venice[3], it was politically, socially and ideologically dependent on Paris.
The Adriatic and Tyrrhenian territories in the south of the peninsula – the current regions of Abruzzo, Molise, Apulia, Basilicata, Campania and Calabria – formed the territory of the French Kingdom of Naples from 1806 to 1814.
At the political, administrative and legislative head of the Empire's enormous territory, which extended from Poland to Spain and encompassed half of Europe, Paris had to "relate" with a considerable number of cities [Tulard 2015, 7]. Most of these were important towns, often the seat of ancient royal houses or long-standing governments, which, within the space of a few years, found themselves dependent on the French city. As the residence of the emperor and the government, Paris was about to become functional and efficient, "modern" in the truest sense of the word.
Talking about «the most beautiful of capitals», Jean-Philippe Garric makes it clear that – whether the subject was ephemeral architecture, new housing or works in the city – the continuous architectural and urban *réaménagement* was one of the most important aspects of Bonaparte's rule, which was also useful for more effectively conveying and propagandising his political and governmental enterprises [Garric 2015a, 185].
The documents, letters and memoirs written in the emperor's hand are punctuated by sentences in which the general imagines making Paris the new capital of Europe.

edited by Jacques-Olivier Boudon in 2003 et Jean Tulard in 1970 and 1991.

[2] Reference is made to the collections kept in the Archives Nationales de Paris, F/14, Travaux publics, cc. 955-1151, relating to public works in the departments of the Empire in Italy, referred to as "Annexed Countries".

[3] On the theme of the cities of Venice and Milan as "semi-capitals" of the same Kingdom, see the PhD dissertation discussed in 2015 by Elena Doria and then published in 2020.

Inspired by the splendour of Imperial Rome – an example of classical grandeur from which Napoleon drew direct inspiration – the French city was to house millions of people and be enriched with palatial buildings, triumphal arches, temples, obelisks and statues [Sarmant, Meunier 2015, 16].

Architectural transformations of the buildings therefore occupied a prominent place in the activities of the imperial administration and the Academies. The Académie Royale d'Architecture had been disbanded in 1793 and, having survived the Revolution without too much trauma, was transformed into the École des Beaux-Arts, which was officially founded in 1819. This refined post-Enlightenment cultural *milieu* taught an art which implied a perfect mastery of drawing. Within its walls, in a system linked closely to the Académie de France in Rome, Napoleon chose and promoted the men who were to become the imperial architects, Charles Percier and Pierre Fontaine. They were responsible for many of the city's building renovation plans, including the design and construction of the Arc du Carrousel, the project for the extension and renovation of the Louvre and the plan for the reorganisation of the rue de Rivoli and the Tuileries[4]. However, it was the engineers who were entrusted with the most important tasks within the general state machinery and in the organisation of works related to the modernisation and redevelopment of the city. On this point, Thierry Sarmant and Florian Meunier note that the emperor had a hand in engineering works such as building bridges and digging new canals [Sarmant, Meunier 2015, 15]. Napoleon wanted to promote the role of engineers in institutions, often appointing them as designers of the works to be implemented and entrusting them with the construction of new public amenities such as fountains, markets, slaughterhouses, cemeteries, new roads, new riverbanks, new gardens and new public promenades. Founded in 1794 following a major Institutional reform, under the auspices of Gaspard Monge (1746-1818), Jacques-Élie Lamblardie (1747-1797) and Lazare Carnot (1753-1823), the École Polytechnique had become and compulsory and preparatory college for the other specialised technical schools – des Mines, des Ponts et Chaussées and du Génie. Directed from 1798 to 1839 by Gaspard de Prony (1755-1839), the École des Ponts et Chaussées was specialised in teachings relating to the construction of bridges and roads, as well as hydraulic engineering works. The technicians chosen from the school by the emperor were destined to achieve a role of crucial importance over the years in the events that we are going to talk about. Characterised by the military rigour of the École Polytechnique and the scientific knowledge acquired in the specialised technical schools, the engineers would guarantee the implementation of rational and well-organised projects for the Empire. In 1811, a specific Bridges and Roads service was created for the Seine department, directed by

[4] For an overview of the figures of Charles Percier and Pierre Fontaine and for an in-depth look at their projects at Bonaparte's court, see the contribution edited by Jean-Philippe Garric in 2012. For the rue de Rivoli *réaménagement* project, see, among others, the contribution editeb by Charlotte Duvette in 2015.

the engineer Louis Bruyère (1758-1831) [Meunier 2015, 107-108] and staffed by other technicians from the École des Ponts et Chaussées. This specific department was to be entrusted with the construction of new roads, new bridges – such as the Pont de la Cité in 1803, Pont d'Austerlitz in 1806, Pont d'Iéna in 1813 and the Pont des Arts, the city's bridge to be made of metal, in 1803 [Lavedan 1977, 71] – and new buildings, along with the development of new water supply techniques.

These operations were to contribute to shaping the urban and architectural layout envisioned by the emperor and included the interventions to be carried out on the water. These were related to both increasing supply and expanding the navigation network – which were considered particularly important, not only because they reflected the technical evolution of the community, but also because they were deemed fundamental to the improvement and operation of the city and the development of the country's transport service. Building on the tradition of supply and regulation projects developed in the late 18th century, the new Napoleonic government focused on the need to plan a new water network for Paris.

Already a famous professor of architecture at the École Polytechnique at the time, Jean-Nicolas-Louis Durand (1760-1834) drew attention to the capital's poor water supply: this aspect made it very different from the *ville des rêves* dreamt of by the emperor, created by superimposing the image of the French city, enriched with fountains and waterways, onto the idyllic image of ancient Rome. At the time, Paris had very few urban sewers: it relied exclusively on the Seine, fed by the Samaritaine pump, the Notre-Dame pump and the two steam pumps on Chaillot Hill [Garric 2015b, 219].

It should be noted – and this is a concept that we will return to later – that the new Napoleonic legislation was beginning to establish water as public, state property, and no longer as the exclusive preserve of a few private individuals, to whom the monarchs and governments of the *Ancien Régime* had sold exploitation licences at a high price.

The reorganisation of the water network was interpreted as one of the fundamental steps towards the modernisation of the city, also from an ideological point of view: as well as the construction of intakes and fountains, the study of a new water system and the recurring planning of new urban canals was a central concern for the Napoleonic government in many parts of the Empire.

Due to its complexity and articulation, the design and construction of the Ourcq, Bassin de la Villette, Canal Saint-Denis, Canal Saint-Martin and Bassin de l'Arsenal system represents a fundamental part of the water reorganisation desired by the Empire and one of the greatest examples of *mise en place de l'eau* in the Napoleonic period. The extension of the capital's water links with the northern and southern areas of the country would represent a new opportunity to physically and ideologically link «the most beautiful of capitals» with the rest of Europe.

II.1.2 Canal de l'Ourcq: Girard and communication with Belgium

The project for the expansion of the canals in Paris still embodies one of the most complete expressions of city water reorganisation and forms the essential basis for comparison with the plans drawn up by French technicians for the waters of the Veneto region and particularly the Padua area.

While issues relating to the supply of water in the French capital were already being discussed by engineers from the mid-seventeenth century onwards, it was in the nineteenth century that things really began to take shape, with the creation of fountains and new specialised areas and, on a territorial scale, the extension of the national navigation network. In spite of its geographical location, it was an old ambition, and one that was shared by the Napoleonic government, to turn Paris into the *port de mer* of Northern Europe.

At hydrographic level, the city lies at the centre of the Parisian water basin, generated by the confluences of the Seine with the Oise, Marne, Yonne and Loing (Fig. 11). Relatively close to the northern border of the country, Paris was the most southerly of the cities which formed the economic and commercial hub of Northern Europe during the Middle Ages, stretching from London to Hamburg, from the North Sea to the Baltic, and to the mouth of the Seine [Lavedan 1977, 8-9].

Fig. 11 - Jean-Louis Dupain-Triel and Victor Dubrena, *Tableau géographique de la navigation intérieure de l'Empire français*, 1750-1811, print [Gallica/BNF].

Towards the end of the Middle Ages, however, the productive basin of the Île-de-France began to be insufficient to meet the needs of Paris, and from the 17th century, when the city had a population of around 400,000, there was also a considerable shortage of water, wheat and timber. It was then that the decision was made to promote the development of the commodities market, which was accompanied by an inevitable expansion of the transport system. In 1638, with a licence signed by Louis XIII, the Canal de Briare was completed, linking the Loire to the Loing and then to the Seine, providing the capital with a direct link to the Atlantic and the arrival of agricultural products from the Loire and the Rhône.

To make up for the ever-increasing shortage of timber, another canal was subsequently built: inaugurated at the end of 1691, the new waterway once again linked the Loire to the Loing, but passed through the forest of Orléans, allowing the harvested timber to flow to the Seine. The canal was fed by ponds in the same valley and also had the advantage of increasing the flow of the Seine during frequent dry periods in summer [Pinon 1987, 7-8].

At the end of the 18th century, the timber flow system was enriched by another canal, located upstream of the Paris basin. Work on the construction of the Canal du Nivernais began in 1784, linking the Loire basin to one of the other tributaries of the Seine, the Yonne. Also upstream of the system, it was necessary to guarantee direct access to trade with neighbouring countries and to plan for the arrival of coal supplies in Paris. To this end, the Canal de Picardie was opened in 1776, linking the River Oise to the Somme and the bay of the same name.

Shortly afterwards, in the late 1780s, work began on the construction of another modern canal, the Saint-Quentin Canal, which extended north-eastwards from Paris. Already commissioned by Louis XV in 1724, the canal would bring numerous benefits to trade between Flanders, Artois, Picardie and the capital [doc. n. 58 of the Documental Appendix][5] and would also open up a direct route between Antwerp and Marseille [doc. n. 58 of the Documental Appendix][6]. Once completed, the canal – which flowed from the Somme to the Escaut – was inaugurated in 1810 in the presence

[5] «*Le roi Louis XV* [...] *ordonna, par son édit du mois de septembre 1724, l'ouverture d'une communication de la Somme à l'Oise; il voulut, par la jonction de ces deux rivières, favoriser les provinces de Flandres, de Hainault, d'Artois, de Picardie et du Soissonnais*», BIB.E.N.P.C., Fonds Prony, c. 8°2248, Travaux des ponts et chaussées depuis 1800, tableau des constructions neuves faites sous le règne de Napoléon Ier en routes, ponts, canaux et des travaux entrepris pour la navigation fluviale, les dessèchements, les ports de commerce.

[6] «[...] *le canal de Saint-Quentin,* [...] *qui offre tant de ressources au commerce de la Belgique avec la capitale, et qui ouvre une grande communication entre Anvers et Marseille*», BIB.E.N.P.C., Fonds Prony, c. 8°2248, Travaux des ponts et chaussées depuis 1800, tableau des constructions neuves faites sous le règne de Napoléon Ier en routes, ponts, canaux et des travaux entrepris pour la navigation fluviale, les dessèchements, les ports de commerce.

of Bonaparte himself, who was able to celebrate the direct arrival in the capital of coal from the Artois mines.

The expansion of links between Paris and the strategic areas of the country now allows us to position the events analysed on a scale that is already territorial. The capital was at the centre of a system of canals that made it possible to cross the whole country without too much difficulty; not only that, but thanks to the system of locks, the network also formed the basis of an efficient, rapid and technically advanced transport network.

To further support all the new canals built between the 17th and 18th centuries, at the end of the 18th century, the idea, previously attributed to the engineer Vauban (1633-1707) and Minister Colbert (1619-1683), of a direct link from Paris to Dieppe in Haute-Normandie, the so-called Canal de Paris, was relaunched [Pinon 1994, 80-81]. With this canal, which was never built, the capital would have been able to ensure a rapid connection with the North Sea, shortening the navigation route via the Seine by several days.

One of the most important and ambitious plans for the Canal de Paris was conceived by engineer Jean-Pierre Brullée (1733-1814), whom we will talk about at length later on; he proposed not only the connection of two loops of the Seine, upstream and downstream of the city, but also its extension to Pontoise and Conflans-Sainte-Honorine. With a view to a possible link with Belgium and other neighbouring countries, Brullée's project was among the first to be conceived from a European perspective [Pinon 1987, 12-13].

At the heart of this general navigation system was the Seine. The river was the backbone of Paris's urban, commercial and social equilibrium, but over the centuries it had become less and less adequate to receive and distribute the large cargoes of goods which, thanks to the creation of the new canals, were arriving from the countryside in ever greater quantities. On one hand, the construction of canals linking the rivers proceeded, while on the other, plans for a new navigation route to support the Seine gradually multiplied. These included the project proposed by Maximin Isnard (1755-1825) for the construction of a canal from Paris to Rouen via the Bièvre, the Yvette, the Vesgre and the Eure, and the project proposed by architect Jean-David Le Roy (1724-1803) to link Paris to Dieppe using almost the entire course of the Seine and the Epte [Pinon 1987, 13].

At the same time, efforts had also been made to solve the problem of supply during dry periods and to increase the river's flow rate, which was useful both for outflow in the event of flooding and to avoid freezing in winter: numerous projects for a duplicate canal were drawn up, the most famous being that proposed by Boisson in 1729.

Although it was possible to imagine a large system linking the capital to the sea, none of the proposals for a canal in support of the Seine were ever realised. This was probably due to the immobility and inertia of the administrative system of the absolute monarchy or perhaps, more simply, to the lack of a solid link between the *savoirs techniques* and the political milieu of the time.

It was in the very early years of the nineteenth century, at the height of consular rule, that questions relating to Paris's water supply and the plans for new urban canals took an absolutely decisive turn, and reached an unprecedented scale: as written by Pierre Lavedan, «*le problème de l'eau est un de ceux qui préoccupèrent le plus Napoléon*» [Lavedan 1977, 71, translation of the author: «the water problem is one of those that worried Napoleon the most»].

The solution to the situation came in the wake of the post-revolutionary movements and the new centralised institutional system set up by Bonaparte. In drawing up a conclusive plan for Paris's new canal system, Napoleon's engineers started from the guidelines that had already been laid down in the eighteenth century. These basically envisaged the possibility of exploiting a precise planning direction. As we have seen, there were two hypotheses: to connect the area of the Arsenal to Chaillot hill, in the form of a fortified canal or a diversion running east to west across the city (Fig. 8); or to connect the Saint-Denis area to that of the Arsenal with a watershed canal or diversion from the north, running north-south.

It was this last possibility that won: with the Consulate's favourable vote, on 17 May 1802 the École des Ponts et Chaussées was asked to draw up a project for the construction, at the State's expense, of a canal to divert a river, later identified as the Ourcq. The first article of the law explains the decision: «*(Article 1er) Il sera ouvert un canal de dérivation de la rivière de l'Ourcq; elle sera amenée à Paris, dans un bassin près de la Villette*» [Graber 2009, 126].

The River Ourcq originates to the north of Paris, in the Aisne department, which is now in the Hauts-de-France region, and flows into the Marne after about 90 kilometres. As envisaged by a decree issued in 1802, the diversion of the River Ourcq was to be at the centre of a much bigger system involving the centre of Paris and its immediate surroundings: the canal was to capture the course of the river north of the city, at Mareuil-sur-Ourcq, and convey the water southwards to a reservoir in the municipality of Villette, near the city limits.

From this watershed area, the burden of water was to be split between two more navigable canals: one, the Canal Saint-Martin, continuing southwards to the Seine, ending at the Arsenal; the other turning westwards and, according to the plan, rejoining the Oise at Pontoise. The canal would never reach Pontoise, but would supply water as far as the municipality of Saint-Denis, which is why it is known as the Canal Saint-Denis. In the description given by the legislators, the canal is seen as a *unicum* which, starting from the Arsenal and flowing through Villette, would continue towards Saint-Denis: «*(Article 2e) Il sera ouvert un canal de navigation, qui partira de la Seine au-dessous du bastion de l'Arsenal, se rendra dans le bassin de partage de la Villette, et continuera par Saint-Denis, la vallée de Montmorency, et aboutira à la rivière d'Oise près Pontoise*» [Graber 2009, 126].

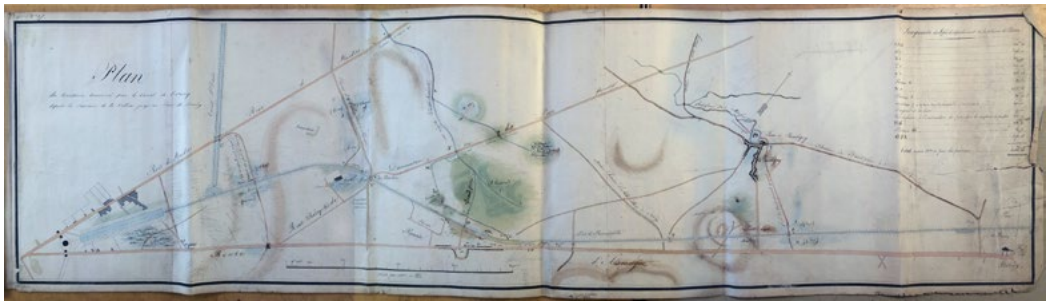

Fig. 12 - Anonymous, *Plan du territoire traversé par le Canal de l'Ourcq depuis la Barrière de la Villette jusu'à la gare de Bondy*, 1802 circa, drawing [ADPa, Eaux, canaux, égouts, an VIII-1934, VO3, c.368].

This system would have ensured that the city had enough water to supply not only private but also public requirements (Fig. 12). On this subject, Pierre Lavedan wrote:

> *Recueillant encore ici le bénéfice des études du XVIIIème siècle, [Napoléon] amène à Paris les eaux de l'Ourcq par un aqueduc à ciel ouvert dans le bassin de La Villette. 115000 hl s'ajoute chaque jour aux 8000 de la Seine et des puits. Un décret de 1806 ordonna que 60 fontaines couleraient nuit et jour dans Paris; Napoléon voulait qu'à cet égard sa capitale fut l'égale de Rome. La plupart de ces fontaines portent bien la marque héroïque, antiquisante et orientalisante de l'époque: fontaine égyptienne de la rue Vaneau, fontaine de Mars de la rue Saint-Dominique, fontaine du Palmier au Châtelet, fontaine des Lions sur la Place du Château d'Eau* [Lavedan 1977, 71].

However, the idea, exploited by Napoleon's engineers, of creating a link with the River Ourcq – and the ancient Valois region – was not a recent one, dating back to the 16th century. In 1528 to be precise, it was thought that the capital's water problems could be solved by having goods travel directly along the River Ourcq as far as the confluence with the Marne and from there on to the Seine. The project to create a direct link between the Ourcq and the Seine, without passing through the Marne, emerged in the second half of the 17th century, after the design and construction of the Canal du Midi (1666-1681) by engineer Pierre-Paul Riquet (1609-1680). The Canal du Midi project – also known as the Canal des Deux Mers because it would connect Bordeaux, and therefore the Atlantic Ocean, to the city of Sète and the Mediterranean via Toulouse – was extremely complex, with numerous locks and machines along its 240 kilometre length [doc. n. 58 of the Documental Appendix][7]. Riquet himself, in 1676, purchased the licences to buy the land needed to implement the Ourcq project [Lavedan 1977, 349], but following his death in 1680, the construction site was blocked. As we shall see, in the 1790s, Riquet's project passed into the hands of Brullé, mentioned earlier, and two entrepreneurs, Solage

[7] For an in-depth look at the design and construction of the Canal du Midi and the figure of Pierre-Paul Riquet, see, among others, Jacques Morand's book edited in 1993, complete with numerous references to sources on the subject.

and Bossu. Then, in 1802, the École des Ponts et Chaussées commissioned Louis Bruyère to level the Ourcq in order to assess the development of a new plan. As a result of his investigations, Bruyère recommended the diversion of another river, the Beuvronne, by means of a simple aqueduct, but, in 1802, the final decision was made to design a link with the Ourcq.

Without fully clarifying its instructions on the project, with a law dated 13 August 1802, the Consulate ordered the École des Ponts et Chaussées to plan the work on the diversion. The Ecole began planning the works, conceiving the new canal as a simple non-navigable supply line, respecting the institution's hierarchical organisation in the management of the project.

Just a month later, with a decree dated 15 September 1802, First Consul Bonaparte appointed Paul Simon Girard (1765-1836), *ingénieur en chef* of the École des Ponts et Chaussées, as *Directeur du canal* [Graber 2009, 71]. However, the powerful Conseil des Ponts et Chaussées was not informed of Girard's direct and unexpected promotion: the appointment immediately caused an uproar and led to a great deal of discontent within the École's hierarchical network. The main reason for this was that the engineer was considered to be the First Consul's protégé, having successfully assisted him in the victorious Egyptian Campaign, and the events surrounding the approval of the project became a real institutional *affaire*, triggered mainly by the new political balance between the administration and the training schools.

Girard had studied Brullée's project for the Canal de Paris (later resumed by Solage and Bossu) and, after being assigned his new role, he immediately proposed connecting an aqueduct to the Beuvronne so that the canal that was to be built could also be navigable. He presented a feasibility project to the École des Ponts et Chaussées in 1803 and, in 1806, he published a detailed quote for the construction of the canal, from which we can clearly see the guidelines and dimensions of the project [doc. n. 31 of the Documental Appendix].

In the document, the engineer states that the main purpose of the diversion was to bring the waters of the Ourcq to an area inside the city, using them for two purposes: to create a navigable canal from the basin down to the Arsenal and the Seine, and to supply fountains, *réservoirs* and sewers, decorating the city and making it healthier at the same time. To ensure that the work was carried out in a rational manner, the engineer divided the project into three chronological parts: first the construction of the diversion canal, from the Mareuil lock to Villette; then, the creation of a system of proper water distribution, both for the supply of the navigable canal of Saint-Martin and for the new fountains and château d'eau in Paris; and lastly, the connection north-east of the Ourcq to the river Aisne, in the stretch from Mareuil to Soissons [doc. n. 31 of the Documental Appendix].

Compared to the projects drawn up by Brullée, Solage and Bossu on the basis of Riquet's legacy, Girard's project was undoubtedly characterised by unprecedented breadth and was materially more advanced. Antoine Picon writes on this subject:

> *Aux rêves de temples à la Concorde, de cirques et de muséums, qui avaient marqué les concours d'architecture de l'an II succède la vision de fontaine jaillissantes, d'eaux abondantes répandues dans la plus belle ville de l'univers. Alimenter Paris en eau par un nouveau canal, n'est-ce point faire de Paris l'émule de l'ancienne Rome, dont les aqueducs ruinés rappellent encore la magnificence d'autrefois?* [Picon 1994, 97].

Compared to past projects, that drawn up for the Canal de l'Ourcq Canal was undoubtedly very articulate, and in order to finance the work and increase the funds available, the government introduced an additional tax on wine entering the city. In Girard's ambitious plan, the canal was to be about 100 kilometres long and equipped with numerous locks, intermediate basins, bridges and secondary water intakes, including those on the Beuvronne. The course of the diversion would run parallel initially to that of the Ourcq and subsequently to that of the Marne, and would have a variable gradient. This was essential for the water to maintain a slow flow speed and thereby ensure safe navigation. At the same time, it had to be fast enough to reach the distribution canals and prevent stagnation, which would have permanently compromised the potability of the water.

The canal was to be used for different purposes: at the emperor's explicit request, the diversion was not only to supply water to the city, but also to allow navigation. By linking the Seine to the Ourcq, boats could also reach the Oise and provide a further link between the Île-de-France and the national network of navigable waterways, bringing commercial development and assuring prosperity.

It is also interesting to note that it was Bonaparte himself who asked Girard not only to ensure the navigability of the new canal, but also to create a direct link with the Aisne in the northern part of the diversion, in order to offer an outlet onto the Saint-Quentin canal, providing a direct connection with Belgium [doc. n. 31 of the Documental Appendix].

The general's role in the decisions made in relation to water and national navigation systems was quite prominent: the need to ensure the abundant supply of good-quality water [Cebron de Lisle 1994, 75] to the capital set Bonaparte's motives midway between those of magnificence and those of utility and, today, we can include him among those we will consider as the *acteurs* involved in the events.

The Flemish territories had a good tradition for the use of water; from a strategic point of view, however, the creation of a water connection would have increased not only the water supply and the volume of trade, but also the transport network and connections, not only on a national but also on a European scale.

Béatrice de Andia clearly defined not only the scope of the urban, political and social significance of the great project, but also the reasons that led to the construction of the new system of canals:

> *Les esprits éclairés invoquent dès lors six raisons pour construire: acheminer l'eau dans la capitale, raccourcir la navigation que les méandres de la Seine allongent, éviter les ponts de Paris dont les arches obstruées rendent le parcours quasi infranchissable, créer une zone d'activité portuaire dans l'Est parisien encore inexploité, éviter les pollutions que causent les déchargements et manutentions en centre-ville et surtout réserver le cœur de Paris à l'urbanisme monumental* [De Andia 1994, 14].

As we will see later, the canal was not only a means of transporting water resources to the city. Above all, it represented a link with the water network developed on a territorial scale and its immediate surroundings would become the site of new specialised areas: a storage area that would be located close to the course of the canal, in the area running from north of place du Château d'Eau (now place de la République) to the area of the Bastille, and a new port area to the south-east, near the Arsenal.
The approval of the diversion of the Ourcq launched the creation of one of the most important water systems of the Napoleonic era.

II.1.3 Canals, basins, the port and distribution of water in the city

At the end of 1802, after a decade of debate and the final approval of the plan and the use of public funds, work finally began on the new system to support the city's water supply. The project was characterised by a certain degree of operational ambiguity: in the ranks of the École Nationale des Ponts et Chaussées, its implementation triggered a conflict of expertise among the teaching staff, which resulted in one of the most exemplary cases of the complex relationship between technology and politics in the 19th century[8].
As we have already explained, the Canal de l'Ourcq was the fulcrum on which the new network of waterways would be based: made up of five separate but inextricably linked parts – Bassin de l'Arsenal, Canal Saint-Martin, Canal Saint-Denis, Bassin de la Villette and Canal de l'Ourcq – the system of so-called «canaux de la ville de Paris» would easily carry the water from the north into the heart of the capital [Beaudouin 1994, 68].
In this context, navigation was to play a key role as one of the main functions of the canals. According to historian Gabrielle Joudiou Bonaparte decides to embellish the city with gushing fountains, to make it clean, to give the inhabitants water and to create waterways for trade [Joudiou 1994, 92].

[8] The controversy over the construction of the Canal de l'Ourcq was also the subject, as we shall see, of research work conducted by Frédéric Graber and published in 2009. By analysing this important dispute, Graber was able to verify the existence and, above all, the stability of the boundary between study practices and other human, political and social activities (see the contribution of Nathalie Montel edited in 2011).

After the approval of the law dated 17 May 1802 was passed – and the appointment of Girard in September of the same year – at a meeting attended by the Minister of the Interior, the Director-General of the Ponts et Chaussées department, the Prefect of the Seine, the mathematicians Laplace and Monge[9] and the engineers Marie Stanislas Becquey Beaupré (1750-1834) and Gaspard de Prony on 8 March 1805[10], Bonaparte decided to approve the project presented by his *protégé* Girard. Despite the opposition of some influential members of the school, the Norman engineer, who had the backing of the Emperor, had planned to design the Ourcq diversion canal not as a simple aqueduct – as recommended by Bruyère following his surveys – but as a navigable canal.

In the meantime, shortly before the imperial approval, Girard had already received a positive opinion with regard to navigation from the Paris Chamber of Commerce, which welcomed the potential expansion of trade with the north of the country and, above all, with neighbouring countries. The construction of a structured navigable canal like the Canal de l'Ourcq opened up the prospect of creating transnational corridors with the other countries of the Empire which would not only increase the volume of trade but would also offer the possibility of planning a *réseau* of connections with more distant territories, such as Northern Italy. The ambitious plan of the Parisian canals was to function as an operational model, a basic project on which to build a much broader network.

The first detailed quote of the works to be carried out appeared in 1806, with the engineer providing a complete inventory of the works to be undertaken, from the first water intake at Mareuil to the barrier at Pantin [doc. n. 31 of the Documental Appendix][11].

The work was launched and in 1807, Girard, in whom the Emperor had increasing confidence, was appointed director of the Eaux de Paris service, which was responsible for the management and operation of all the capital's water resources, from supply to aqueducts and the maintenance of water pumps.

Not long after work began on the diversion, the first water arrived in the La Villette area, where, on 2 December 1808, the large basin entered into operation for the first time [De Andia 1994, 15]. It took several more years, through the fall of Bonaparte and the advent of the Restoration, to complete the construction of the two distribution canals, those of Saint-Denis and Saint-Martin. With the collapse of the Empire and the return of the Bourbons to France, there was a dramatic lack of funds for hydraulic engineering

[9] Mathematicians Pierre-Simon Laplace (1749-1827) and Gaspard Monge attended the meeting in representation of the Istitut National des Arts et Sciences.

[10] Engineers Joseph Becquey Beaupré (1750-1834) and Gaspard de Prony (1755-1839) attended the meeting as members of the École des Ponts et Chaussées.

[11] This first quote was followed by others, updated and perfected as and when necessary, following the progress of the works. In 1812 the *Description Générale des différents ouvrages à exécuter pour la distribution des eaux du Canal de l'Ourcq dans l'intérieur de Paris et devis détaillé de ces ouvrages*, compiled once again by Girard, was published. A copy is still conserved today at the Library of the Federal Polytechnic of Zurich (ETH-Bibliothek Zürich).

works and the project came to a standstill. In 1818, however, with the direct intervention of Louis XVIII, work resumed: Girard was confirmed as director and, thanks to the investment of private capital, the Compagnie des Canaux de Paris was set up to privately manage the sites. The Canal Saint-Denis was inaugurated in May 1831. The new canal, which should have flowed as far as Pontoise and into the Oise, branched off just before the arrival of the Canal de l'Ourcq at La Villette and reached the Seine in the municipality of Saint-Denis, crossing the plains of Aubervilliers. After its reconstruction and enlargement at the end of the 19th century, the canal was about seven kilometres long, with twelve locks and a difference in level of about 30 metres.

Four years later, after the completion of the Canal de l'Ourcq at the end of 1822, the system began to run smoothly: the full course of the Canal Saint-Martin was opened on 23 December 1825. It was at the sole service of the city: from the basin of La Villette, the canal crossed Paris from north to south, flowing alongside place du Château d'Eau and arriving, after place de la Bastille, at the bassin de l'Arsenal in the south, through which the canal's waters flowed into the Seine. Only partially buried within the scope of Haussmann's *grands travaux*, from boulevard Jules Ferry to place de la Bastille, the canal was almost five kilometres long and covered a difference in level of about 25 metres. To allow boats to cross the city and access the loading and unloading docks, the route was structured around nine locks, which delimited ten basins and the same number of bridges and walkways (Fig. 13). After passing the Bastille, and crossing the Arsenal, the canal arrived at the Seine. The confluence between the main river and the canal would be the site of the city's new south-eastern port, where incoming cargo from upstream of the capital would arrive [De Andia 1994, 16].

The Canal Saint-Martin area is still one of the most important areas in the city today, not only because, to quote Bertrand Lemoine, it remains the only waterway through Paris, offering the visual effect of a pretty landscape [Lemoine 1987, 61], but also, and perhaps above all, because it had the fundamental merit of re-semantifying – at urban and social level – one of the most complex fringes of Paris, to the north-east between the walls of Louis XIII and the belt of the Fermiers Généraux. In the 1830s, the canal was lined with wharves, cargo loading and unloading points and industrial and port buildings, such as customs warehouses, salt deposits and the excise office: the Entrepôt du Marais was created in 1833 and was joined in 1835 by the customs offices and in 1838 by the Entrepôt du Sel, which handled the stocks previously stored in the warehouses on boulevard Beaumarchais and rue Amelot[12].

The canal was the transport route for goods, foodstuffs and construction materials into the heart of the capital. Together with the banks of the Canal de l'Ourcq, the presence

[12] On the subject of the birth of customs structures and warehouses along the Canal Saint Martin, see, among others, the texte of Sara Von Saurma edited in 1994 and the contribution of Solenn Guével edited in 2006.

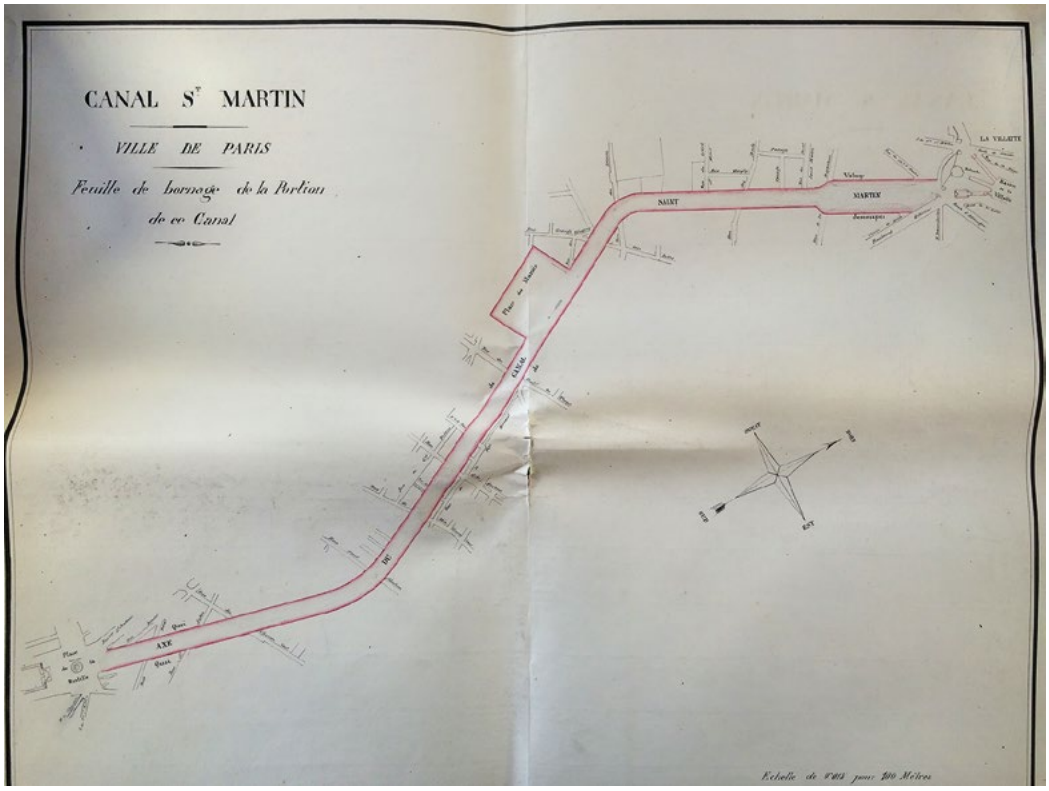

Fig. 13 - Anonymous, *Canal Saint Martin, Ville de Paris, Feuille de bornage de la Portion de ce Canal*, 1802 circa, drawing [ADPa, Eaux, canaux, égouts, an VIII-1934, VO3, c.493].

of the Canal Saint-Martin changed the organisation of the city's north-eastern *faubourgs* forever: operating as a navigation network that crossed Paris efficiently from north to south, the canal gradually upgraded the areas it flowed through and, allowing the easy import and export of goods, the whole system enriched the city and connected smoothly to the traffic of the Seine thanks to the presence of new port depots.

The hinges of this complex water transport system were essentially the two basins: the Arsenal to the south and that of La Villette to the north.

Located on the right bank of Paris, in the south-eastern part of the city, the Bassin de l'Arsenal was created on an area surrounded by moats and ramparts. In prehistoric times, the area had been the site of the ancient course of the Seine: before undergoing the radical transformation that brought it to its current course, the river changed its course at Saint Paul and ran along what are now the Grands Boulevards [Garreta 1994, 29]. Occupied by a military arsenal that served the fortress of the Bastille until the end of the 18th century, after the Bastille was destroyed during the Revolution, the area underwent further excavation to increase its capacity and was then filled with water from the river.

At the end of the 18th century, when there began to be talk of diverting the River Ourcq to the north and building a new canal that would cross the city southwards as far as the Bastille, the area was the scene of numerous urban embellishment and *réaménagement* projects and, from the outset, numerous changes to the city's docking system were planned. The presence of the large expanse of land between the Arsenal and the Bastille prompted the engineers to submit very extensive urban planning projects that went way beyond the real need to create a dock at the mouth of the Canal Saint-Martin: these plans went from large parcels of land – with circular plazas, radially-positioned avenues branching away from them and supporting buildings – to the plan for a market square in place of the fortress, with a halle aux boissons overlooking the port area [Pinon 1987, 33].
The lowest common denominator of all the projects – the construction of warehousing and storage facilities – was designed to strengthen the basin's vocation as the city's new port. The problem of landing and mooring in the city had always been one of the trickiest to solve: until the new city canals were built, goods arrived in the city only along the Seine, and were mostly unloaded and stored on the right bank of the river.
The timber warehouses, on the other hand, were almost all concentrated between the Bercy area – where the largest of the wine warehouses was also located – and the island of Louviers[13]. In the 18th century, with the arrival in the capital of the first coal supplies from the north, the problem of creating a port to the south of the city, to take advantage of the naturally ascending navigation from north to south, arose. Various proposals followed, including that of building a coal depot at the foot of the Tuileries terrace. After the transformations carried out in 1789, however, it was the Arsenal area that was chosen for this type of function [Pinon 1987, 23].
From 1804, following the plans drawn up by Girard for the construction of the Canal de l'Ourcq and the Canal Saint-Martin, the renovation and redevelopment of the area were entrusted to engineer Joseph Beaupré, who, as *inspecteur* des Ponts et Chaussées, had attended the meeting held on 8 March 1805. As a new port area, the Arsenal was the hub around which Beaupré would centre his specialised buildings. A large flour store, the grenier de réserve, was built on one of the two boulevards bordering the Arsenal, boulevard Bourdon, between 1807 and 1820 and extended between 1840 and 1848. On the other side of the river, the left bank, the General Warehouse for Wines and Spirits, the halle aux vins, which also served as a support for the Bercy warehouses, storing wines intended exclusively for export, was built between 1811 and 1836 [Pinon 1987, 24]. Thus designed, the basin was finally filled with water and commissioned in 1825, forming the southern "head" of the distribution canals.

[13] The Isle de Louviers was a small island in the Seine, east of the Île Saint-Louis, in front of the Quai des Célestins. In 1847, the branch of water separating it from the right bank was filled with earth and the island was attached to the mainland at Quai Morland.

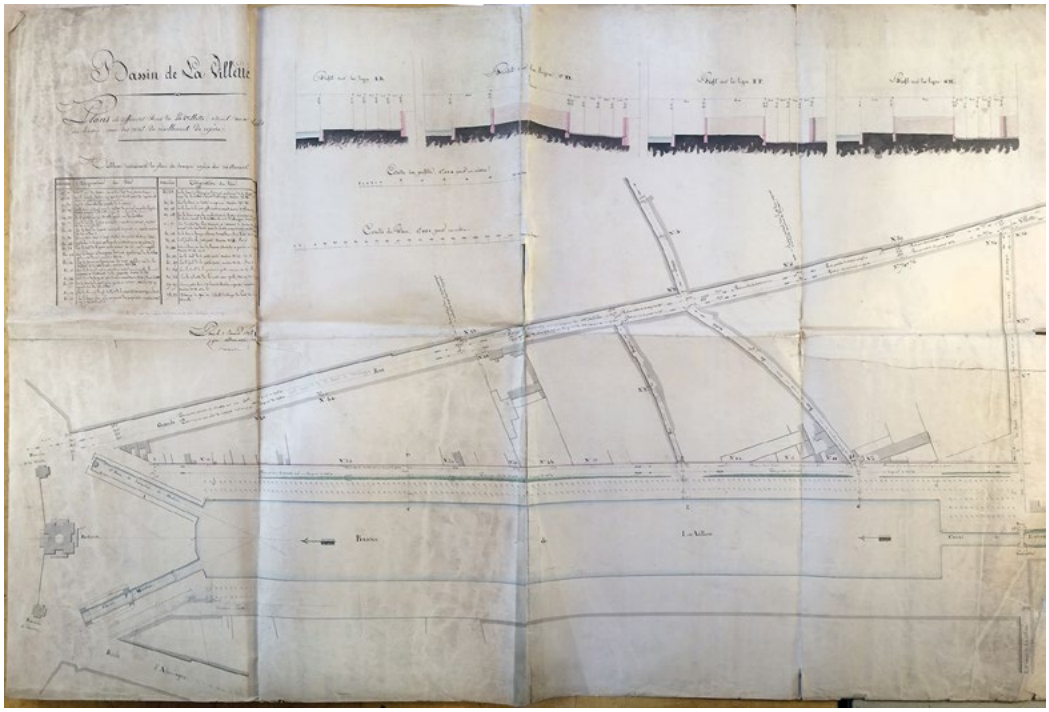

Fig. 14 - Anonymous, *Bassin de la Villette*, 1802 circa, drawing [ADPa, Eaux, canaux, égouts, an VIII-1934, VO3, c.493].

Without a direct outlet into the main river and having been initially built as a resting and distribution area, the La Villette basin was inaugurated on 2 December 1808. The basin was the point of arrival and re-distribution of water from the Ourcq diversion, and was the northern "head" of the water distribution system.

The area of the collection point is located on one of the northern fringes of Paris, in an area which, before the Haussmannian annexation in 1860, was still a suburb. Today, the area is still a plain between two hills, the Butte Montmartre and the Butte Chaumont, and enjoyed a very advantageous tax regime at the time: located just outside the city, the area was not subject to the payment of customs and excise duties imposed by the City of Paris. This aspect in particular, together with the ease of adaptation and the position, made it the ideal location for industrial and commercial activities [Montel 2001, 53].

Physically, the dock was made up basically of two smaller, interconnecting basins: one linked to Paris, which measured 700 metres long and 70 metres wide, and a smaller one that articulated the space to the north, at the intersection of the gare circulaire, the junction between the Canal de l'Ourcq and the diversion of the Canal Saint-Denis (Fig. 14).

From its first filling with water in 1808 until the Canal de l'Ourcq was fully opened in 1822, the Bassin de la Villette, especially the part closest to Paris, was almost exclusively a place for holidays and recreation: drawings and etchings of the time often portrayed the

area as rural and bucolic, radically different from the part of the city around it. Cabaret and music shows were held there, and the water was used for skating in winter and bathing in summer, as well as for line-fishing and big parties with boat races. Numerous etchings produced in the early years of activity in the area depict these activities in a humorous and caricatured manner, often portraying old gentlemen tumbling on the ice or ladies seeking a little refreshment to cope with the summer heat [Backouche 2010, 61-62].

In the years following 1825, with the opening of the canals and the complete operation of the system, the vocation of the basin changed, and it took on a mainly industrial and commercial character: the banks on the water's edge were used as a free zone for unloading goods, while the area further back was characterised by the presence of warehouses for storing materials [Backouche 2010, 65-66].

Four major types of products circulated on the system of canals converging in the area: building materials, raw materials, fuels and waste products. In addition to the raw materials that came from the port of Le Havre (coffee, cocoa and spices), each canal brought products from just one specific area: the canal de the Ourcq received goods from the Marne valley; the canal Saint-Denis carried products from the area of the northern tributaries of the Seine (building materials from Oise and fuels from Pas-de-Calais, Belgium and England); the canal Saint-Martin operated in both directions, carrying materials from the Seine to the north or from the north to the Seine. These materials included sand, stones, coal and firewood, which were transported down to the main river, and waste products, which were transported upstream to Aubervilliers [Backouche 2010, 56-57].

This is why, when the canals were fully opened, it began to be impossible to tell which goods had come from the Seine and which had come via the canals: this standardisation of water transport flows led to the use of a single term in the sources, in which the expression "Port de Paris" corresponded, indistinctly, both to goods arriving by river and those transported via the canals. So we can say that the two separate systems of the river and the canals together constituted the main axis of product circulation in 19th century Paris.

Even more so if we consider that the basin of the Arsenal, the large area of La Villette to the north of the city, became the place where goods, including those that did not come from the canals, were stored. It is documented that, in 1825, the goods that landed at La Villette were essentially of two types: those which usually arrived in Paris – such as sugar, fuel, metals, soap and tobacco – and those which were distributed in the city exclusively via the canals, such as foodstuffs – like cod, plums, sultanas, rice, cocoa and pepper –, some building materials – such as stones and bricks –, certain types of medicinal spices – such as almond, turmeric, gum and mercury –, some chemical substances – such as pumice stone, alum, lead and bone char – and some furniture made from typical Mediterranean species of wood – such as cedar and lemon. It should also be pointed out that, for certain types of goods, the sorting area in La Villette completely bypassed the

Seine: raw materials from the Atlantic, for example, were unloaded exclusively in the basin, as the port of Saint-Nicolas on the Seine below the Louvre, was deemed unsuitable. In the years that followed, the dock, commonly known as Port de la Villette, bore the brunt of the arrival of the railway and the fact that, over the decades, navigation on the Seine had been made much safer than before. In any case, thanks to its location to the north of the capital and its proximity to the city's two main railway stations, the North and the East, the basin continued to provide the company that owned the canals with a good volume of traffic, which was boosted further by the construction of the Petite Ceinture railway and La Villette station in 1865 [Backouche 2010, 60; Montel 2001, 64].

In the years that followed, the Canal area underwent numerous adaptations and renovations, mainly due to the ever-increasing volume of commercial traffic, but it was towards the end of the 19th century that the area turned towards a more purely industrial vocation, becoming one of the region's major manufacturing centres[14].

The northern "head" of the system was one of the main hubs of the network designed by Napoleon: the *aménagement* works equipped Paris with an efficient supply, transport and navigation system. This is clearly demonstrated by a map dated 1860, found in the Archives Nationales, which shows the distribution of the water brought into Paris by the new system of canals (Fig. 15). A simplified plan of the capital shows the two waterways that ran from La Villette through the city from north to south: to the west was the Aqueduc de Ceinture, which descended towards what is now the Grands Boulevards area and supplied the left bank of the city, particularly the areas of the Hôtel des Invalides, the École Militaire and the École de Médecine, next to the Senate building; to the east, on the other hand, was the route of the canal Saint-Martin, which, as well as ensuring proper navigation up and down the canal, fed the guardhouse in what is now the rue Faidherbe area – near the barrière du Trône in Nation – and, running under the pont d'Austerlitz, also a small part of the Jardin des Plantes.

The new system of canals and basins in Paris was not only an efficient way of transporting goods and a solution to the water supply problem, it was also a functional means of regenerating parts of the territory: characterising that precise portion of the capital located to the east and halfway between the city and the suburbs, the storage and warehousing structures supporting the canals and basins would accelerate that rapid process of industrialisation of the urban fabric of the eastern districts, the so-called "Est Parisien", which, between the 1830s and 1860s, would undergo an unprecedented acceleration.

Although it was only finally completed in the 1820s, the system was organically conceived in the Napoleonic era. We could therefore consider it as one of the most complete expressions of the interest of Bonaparte's technicians in the theme of navigation on an urban and territorial scale. As well as directly involving figures, such as Prony, who also

[14] On the eighteenth-nineteenth-century process of economic and commercial industrialisation of the city, see the publications of Thomas Le Roux edited in 1996, 2011, 2013, 2015.

Fig. 15 - Anonymous, *Plan générale de la distribution des eaux du Canal de l'Ourcq dans l'intérieur de Paris*, 1806, drawing [ANFr, F/14 Travaux Publics, c.7012].

worked on the water networks in Northern Italy in the same years, the development of the project would seem to follow a precise trend: developing ideas for a new, large-scale navigation network, the engineers and governors of the First Empire conceived the international water link as the most efficient and practical transport route, ensuring not only the smoothest organisation of the trade system, but also linking together entire strategic areas of the Empire.

II.1.4 Technicians and politics under Bonaparte: the Ourcq *affaire*

The events surrounding the long and complex construction of the Canal de l'Ourcq and the capital's canal system had generated a real fracture in the operational model of the *mise en place de l'eau*. In this context, Pierre Simon Girard and Gaspard de Prony had been two of the key players in the passage to a new dialectic between technical decisions and the political choices of the Empire, with the demands of modern international politics on one hand and those of technical know-how and the hierarchical organisation of the 18th-century École on the other.

With the creation of the École des Ponts et Chaussées in 1747, France had been the first European nation to organise a definitive reform in the territorial and urban planning system, basing the work of the Ponts et Chaussées engineers on a rather close relationship between central government, the territory and *savoir technique* [Chimisso 2016, 37] [15].
During the period of the Consulate, the engineering corps had to face up to the hardships of what was to be a crucial moment for an organisation that had weathered the storm of the Revolution, not without difficulty, and which, from 1800, lost its autonomy and came under the direct control of the State and the Prefect [Montel 2001, 275]. From then on, there was a marked increase in discontent within a corps that wished to retain its autonomy and operational prerogatives, and which resented the new administrative hierarchies. In August 1804, the Empire issued a specific law defining the new organisation of the Corps des Ponts et Chaussées.
In this context, it is essential to consider the construction of the new network of Parisian canals as a key case. Frédéric Graber has defined all the events surrounding the construction of the Ourcq system as a veritable *affaire*. The analysis centres mainly on the debates held within the assembly of the École: today's debates serve as litmus tests in a historical and social sense. Their analysis sheds light on the operating mechanism of public administration, that system of actions and reactions between public power on one hand and knowledge on the other.
With the direct intervention of the Emperor in the technical aspects linked to the construction of the network of canals, the new balance of relations highlights not only the contacts between power and knowledge, but also the hostilities, the interests of the personalities involved, the generational conflicts between the protagonists and, last but not least, the real weakness of hydraulic knowledge at the beginning of the 19th century [Montel 2001, 275].
The new French administration made it quite clear that it wanted to create a large-scale navigation network: even before creating a road network, Napoleon's government intended to create a navigation system that would provide access to a large part of the Empire's territories. The benefits of such a structured and efficient system could be measured not only in relation to a definite increase in the volume of trade, but also in relation to the benefits to local agriculture, the transport of goods and, on a small scale, people.
Studying the case of the Ourcq Canal makes it possible not only to identify the recurring actors – such as Bonaparte, Gaspard de Prony, the contractors involved in the exploitation of the water and the future users of the new canal – but also to isolate, in a more general sense, the dynamics linked to the transformations of European water networks.
An analysis of this kind is useful for gaining a better understanding of the technical and political articulation of this type of work – the ambitions, strategies and design trends

[15] On the education of state engineers in France, see also, among others, the contribution of Nathalie Montel edited in 2015 and the text edited in 1992 by Antoine Picon.

– allowing us to more accurately contextualise the work carried out in the Adriatic area and to understand the strategic importance it could hold for trade and cultural exchange in Europe.

The figure of Gaspard de Prony, in particular, plays an important role in this investigation. As we shall see later, Prony, together with his colleague Sganzin [16], was the leader of a long expedition to Northern Italy. Travelling by boat across the entire northern part of the country, from Milan to Venice, the French technicians used the existing navigation lines for the crossing. They assessed their conditions, recorded their greater or lesser modernity and efficiency and, above all, proposed a series of operations to be implemented not only to preserve, but also to strengthen the water network in the northern part of the country, involving the area of Venice and especially Padua.

[16] Joseph Mathieu Sganzin (1750-1837) was an engineer and Inspector General *des Ponts et Chaussées*, in charge of maritime and hydraulic works. Together with Prony, he carried out a series of expeditions to Italy to verify the state of navigation of its rivers and canals. During the period of the First Empire, it was Sganzin who was particularly responsible for the work to be carried out in the main ports of Europe.

II.2 Canals for Europe: expansions and large-scale projects

II.2.1 Enhancing national and international water connections

Placing the capital at the centre of a strategic transport flow, the Parisian canal system was not an isolated supply and connection branch, but part of a much larger framework of connections.

Having highly efficient road and especially water transport networks was a high priority for the French government. Good transport links between France and the countries it conquered would have brought numerous benefits: on one hand, it would have ensured that trade could be effectively streamlined and, on the other, it would have helped smooth communications between the central power in Paris and local governments, facilitating the circulation of cultural and operational models from one nation to another.

It was in the central years of the imperial decade that an increasing number of studies, analyses and surveys on the situation of connections in France's neighbouring countries were produced. These were years of intense work for the central government: ministers, officials and technicians of the Service des Ponts et Chaussées found themselves managing a huge area of intervention, which included very different territories, which were sometimes difficult to reach and had old and inefficient water transport networks. Italy, in particular, was an area of great interest for the Empire's activities. Rich in water, steeped in history and art, home to important river cities, the northern area of the peninsula represented for the government of Paris not only a large economic and commercial basin, but also the essential passage to the south-east: the corridor to Adriatic and East Coast territories.

It was therefore necessary not only to consider the improvement of existing road connections, but also to plan the construction of new ones. With this in mind, in the consular period between 1802 and 1803, the Ministry of the Interior produced numerous reports on the state of navigation, both within France and internationally.

Already formally led by Bonaparte, the consular government proceeded with a comprehensive assessment of the conditions of the existing waterways in order to plan consolidations, enhancements and extensions to the network. There are many projects and records concerning the construction or the planning of maintenance work to be carried out on the canals of the major rivers in France, especially in the north-east of the country – to guarantee a connection with Germany, Belgium and the territories of Flanders – and on the roads that led to Italy and stopped just before the Alps.

But it was with the birth of the Empire, and the hierarchy of professional figures in the specialised technical schools, that the studies carried out by the Ministry of the Interior, and particularly by the technicians of the École Nationale des Ponts et Chaussées, became more and more ambitious, reaching European scale.

Two documents, among the many of the time, give an account of this extensive work: the first is a catalogue compiled by Sébastien-Michel Courtin, a former member of the Assemblée Nationale, which gives a complete list of the works of the service of Ponts et Chaussées – roads, bridges, canals, river navigation and ports – carried out from 1800 and throughout the reign of Napoleon I [doc. n. 58 of the Documental Appendix]; the second is a general presentation of the state of the works planned by the *Service des ponts et chaussées* between 1803 and 1805, in both technical and financial terms [doc. n. 32 of the Documental Appendix]. The two documents, which take the form of detailed catalogues, provide a fairly complete picture of the plan to improve the water and river network at both national and European level.

Not without emphasising the static nature of the sovereigns of the Ancien Régime compared to the dynamism of Napoleon's government [doc. n. 58 of the Documental Appendix] [17], Courtin makes it clear that, from the 19th century onwards, the strategic attentions of the Emperor and the *Service des Ponts et Chaussées* were directed not only at French but also at Italian structures, especially in the departments beyond the Alps: «*Dès les premières années du siècle [...] les regards du Monarque ne se sont pas seulement fixés sur l'ancienne France, de grandes communications s'ouvrent dans les nouveaux départements au-delà des Alpes*» [doc. n. 58 of the Documental Appendix].

Both documents mention the work carried out to build the Simplon road, which connected France to Milan via Switzerland, the Mont-Cenis and Montgenèvre roads, which connected Savoy to Piedmont, and the rectification of the Mont Blanc pass.

It is, however, when talking about the construction and *réaménagement* of the national canals that we gain a better understanding of how, in the period of the First Empire, the organisation of a fluid navigation network had many more advantages than that of an efficient road network. Courtin explains that, besides having the advantage of alleviating the burden on road routes, making them easier to maintain, the construction of major waterways guaranteed the prosperity of the agriculture and trade of the countries they crossed, increased the value of the land and multiplied speculation and the amount of taxes, ensuring the complete economic sustainability of the work [doc. n. 58 of the Documental Appendix] [18].

For this reason, the attention of the Emperor and the technicians at the École was focused, among other things, on the design of a major junction between the Rhine and

[17] «*Les ordres des souverains [de l'Ancien Régime] se renouvellent fréquemment sur le même objet, peuvent convaincre de l'indifférence qu'on mettait à leur exécution, et des obstacles qui s'y opposaient*».

[18] «*On a reconnu depuis longtemps l'utilité des canaux pour les grandes communications, la prospérité de l'agriculture et du commerce, on y trouve aussi l'avantage de ménager les routes par la diminution du nombre de voitures qui les parcourent et les fatiguent.* [...] *Tous les pays que parcourent ces canaux reçoivent une nouvelle existence. L'agriculture s'améliore, les produits augmentent, les terres ont plus de valeur, le commerce s'étend davantage, les spéculations de multiplient, les transactions deviennent plus fréquentes, par conséquent l'impôt et les taxes augmentent avec cet accroissement de prospérité, et font rentrer promptement les capitaux* [...]».

the Rhône. The project, known as the Canal Napoléon, was never implemented but had it been, it would have made it possible to connect Northern and Southern Europe, taking advantage of the Rhine's northern course and the outlet of the Rhône into the Mediterranean.

As we will see later, this idea was partly resurrected, under the name *Navigation Bonaparte*, by a technician from outside the school's ranks. Imagining a link between the Seine and the Rhine, and exploiting the course of other European rivers and canals, the inventor intended to demonstrate the possibility of reaching all the territories that were part of the Empire, including Venice and the mainland of Veneto.

Along with the creation of new connecting canals, the French government also considered it of the utmost importance to work on improving the navigation of natural rivers, which would generate considerable economic revenue from the exploitation of navigation rights.

The waterways created with the construction of the new canals had, in some cases, created imbalances in the old water supplies of the rivers or had been built without really checking the navigability of the stretch of river to which they were connected [doc. n. 58 of the Documental Appendix] [19]. For this reason, the government also went on to plan an improvement in the navigation of natural rivers, particularly the River Po.

An authority dedicated to monitoring work on the river, the Magistrato del Po, was created to properly oversee the projects. This body was made up of four commissioners present in the area and a permanent member at the Council of State in Paris. The magistracy, which was responsible for drawing up the plans, was required to seek double approval, initially from the general council of the Service des Ponts et Chaussées, with final approval from the Emperor.

Crossing the northern part of Italy from east to west, the River Po was one of the focal points of French interests: its course guaranteed access to a large part of the Italian territories under imperial jurisdiction and was above all the link between the Mediterranean and Adriatic areas [20].

It was precisely on the navigation of the Po area that Gaspard de Prony's interests were focused. The French engineer had inspected the entire course of the main river and its tributaries, not only to improve navigation, but also because, as the documents show, two projects for connection with other Italian rivers had been developed: a canal to allow the Emilian Reno to flow into the Po and a plan to connect the Po to the Piedmontese Stura,

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[19] « [...] *il est arrivé souvent que par trop de précipitation on avait adopté l'ouverture des canaux sans avoir examiné si à leur point de jonction les rivières étaient navigables, ou si elles l'étaient dans tous les temps de l'année*».

[20] There are many documents on the importance of the Po, on the analyses of its navigability and on the projects for the *réaménagement* of its course in French institutions, in particular at the Bibliothèque dell'École Nationale des Ponts et Chaussées in Paris; among others: BIB.E.P.C., *Fonds Prony*, cc. Ms.741, Ms. 1290, Ms. 1095.

with the latter branch joining the River Tanaro, which touched the border between Piedmont and Liguria [doc. n. 32 of the Documental Appendix].
Moreover, according to another document, contained in Prony's personal papers [doc. n. 24 of the Documental Appendix], the link between the Tanaro and the Stura on one side and the Po on the other had been the subject of a proposal previously made to the Emperor by Ignazio Bonafous[21]. Bonafous envisaged associating this connection with the construction of a carriage road that would permit travel from Alba to Savona. This would ensure a direct connection between the Mediterranean and the Adriatic, which would bring numerous economic and commercial benefits to the more isolated areas of Piedmont.
In this context, it is now quite clear that what was happening in Paris reflected an international trend: within the space of a few years, French interests had significantly broadened their horizons to include the rest of Europe, while the projects of the Service des Ponts et Chaussées were visibly attempting to weave solid water connections between France and Italy.

II.2.2 The *Navigation Bonaparte* (1804): a single link for the Empire

Among the grand plans envisioned by the engineers of the First Empire and by Bonaparte's strategy, particular importance was placed upon the project to create a direct link to the River Rhine. Because of its course and morphology, the junction with the great river represented a crucial strategic point, which translated into an increase in traffic, the volume of trade and a consequent expansion of the Empire's economic flows. This idea – for which unfortunately there is no trace of the precise date of drafting[22] – already included as a project in the catalogue of works to be carried out by the Service des Ponts et Chaussées under the name Canal Bonaparte, envisaged the construction of a navigable canal linking the Lyon section of the Rhône to the Rhine, thus creating a direct link between Northern Europe and the South of France, all the way to the Mediterranean.
Because of its shape and location, a connection to the Rhine would have made it possible to reach a large part of the Empire's foreign holdings by water and, above all, would have opened up an important route to the eastern territories. Probably on the basis of this plan, and following what was a fairly clear trend between the wishes of the technicians at the *Ponts et Chaussées* and the Emperor himself, a proposal for a project called *Navigation*

[21] Ignazio Bonafous (1758-1836) was a Jacobin patriot who organised the 1796 Alba Movement, in agreement with Filippo Buonarroti. His relations with Buonarroti made him suspect in the eyes of the French and, during the Imperial period, he had to withdraw into exile near Mantua, in San Benedetto Po.

[22] The document referred to is a collection of works planned, launched or carried out under the Empire and updated to 1806. The description of the projects does not include the dates on which they were written.

Bonaparte was published in 1804. The plan once again aimed to link one of France's major rivers to the river at the Swiss-German border: in this case, the proposal contained in the *Navigation Bonaparte* was to link the course of the Seine – and consequently Paris – to that of the Rhine; from there, according to the author of the project, using the routes of the rivers that were already open and those of small junctions to be made by digging canals, it would have been possible to reach practically all the territories of the Empire and to arrive at the seas around them [doc. n. 25 of the Documental Appendix][23].

The author of the project is Marcel Prault de Saint-Germain. There is still very little information about this mysterious figure: born in 1737, the date of his death, which is still unknown, is probably after 1804, the year in which the project was written and published.

His real profession is also unclear: he describes himself in the document as a hydraulic engineer and geographer[24], but some sources in the Bibliothèque Nationale de France and the Royal Academy of Arts state that he was an *imprimeur-libraire*[25], heir of an old family of printers.

No further information on Marcel Prault de Saint-Germain has been found to date, but from research into the records of members of the Corps of Engineers, it is almost certain that he was not part of the team at the École Nationale des Ponts et Chaussées. In contemporary terms, his position would appear to be that of a "freelancer": an independent scholar, outside the political and administrative hierarchies of the official schools.

Despite his position as an outsider in the ranks of the École, Saint-Germain applied himself with dedication to drawing up the project, studying its details, identifying the work to be done, the distances to be covered, revealing its technical characteristics and aiming to demonstrate its benefits with a certain resolution. Between 1802 and 1804, even before the independent publication of the dossier, the author had already tried to present the preparatory drawings for the project at the Salon du Louvre [Nodier (1809) 1995, note no. 20], but was not admitted. However, it is certain that he had already

[23] The original copy consulted and mentioned here is kept in the Archives de Paris. According to the author's research, two other originals of the document exist in the archives of French institutions: one is kept at the Archives Nationales de France (AF/IV/1055), and the other can be consulted at the Bibliothèque Nationale de France. The Bibliothèque Nationale de France published in 2016 a copy of the project in a volume in collaboration with Hachette (see in critical bibliography Prault de Saint-Germain [1804] 2016).

[24] On page 24 of the document, the author signs as *Ingénieur hydraulique et Géographe* declaring residence at n. 21 Rue Carême-Prenant, now Rue Bichat in the 10ème arrondissement de Paris.

[25] Among others, it is possible to mention *Les égarements du coeur et de l'esprit, ou Mémoires de Mr de Meilcour*, a romantic work by Claude-Prosper Jolyot de Crébillon, and *Vocabolario Portatile per agevolare la lettura degli Autori Italiani, ed in specie di Dante*, written in 1765 and 1769 respectively and published by the *imprimeur-libraire* Marcel Prault de Saint Germain.

had the opportunity to show the drawings of the plan to the emperor [doc. n. 25 of the Documental Appendix][26].

The author presents the project as a simple connection, in five sections, of the waterways between Paris and Strasbourg. Starting from the capital and going as far as the ancient *Strateburgus*, the connection would have linked up with the northern canals to Le Havre and Dieppe on one side and enabled a link to the Danube and Elbe on the other. From there, again according to the author's plans, It would be possible to reach the other seas overlooked by the territories of the Empire.

According to the author's calculations, this vast canal system would have been designed to allow both small and large vessels to navigate it. In addition to the large Ourcq system, which, as we have seen, was in the process of being approved and built at the time, Marcel Prault de Saint-Germain had envisaged the construction of a new port in Paris. Located in the area between the site of the old fortress of the Bastille and the aforementioned isle de Louviers, the new commercial port would have been equipped with a grand guardhouse, decorated with the sculpture of a chariot of plenty pulled by the four famous bronze horses that had been confiscated from St Mark's Basilica in Venice. Once again, the area to the south-east of the right bank of the river became the main site of the city's new commercial area.

Of course, all these proposals represent an approach which, while it cannot be described as utopian, presents wide margins of difficulty in relation to its feasibility.

For the purposes of this investigation, however, the most interesting and innovative aspect of the plan is that the author envisaged making it possible to reach the seas overlooked by the Empire's holdings by water. Of all these, as can be easily understood, a fundamental and strategic role was obviously played by the outlets onto the Adriatic and the Mediterranean. The two seas, which surrounded the area of the Kingdom of Italy and the Italian departments of the Empire, represented fundamental resources. The Mediterranean created a link with the country's biggest islands and with the Spanish and Portuguese areas – and from there to the New World; the Adriatic made it possible to reach the future Illyrian Provinces and, above all, the territories of Venice and the Venetian mainland.

It was precisely this area of the Kingdom of Italy that was to represent a particularly important strategic zone for the Empire's technicians, whether they were part of the political and administrative hierarchy or not: Venice, with its direct access to the sea, and the Padua hinterland, a preferential junction for connections with the north-west of the Italian peninsula and the south of the Kingdom.

Marcel Prault de Saint-Germain makes this intention quite clear, emphasising, in a precise passage of the document, the details concerning how to reach the gulf of Venice

[26] «*Daignez donc, SIRE, agréer mon projet et mes plans, dont j'ai déjà eu l'honneur de Vous présenter les dessins* [...]».

and from there the mainland, all the way to the connection with the Mediterranean. From the Seine to the Rhine, it would have been possible to exploit the connection to the Danube; the author planned to cross the ancient Presburg along this river, from where the boats would have been able to access a small tributary. Thanks to the opening of a new 10-league canal crossed by the Drava and the Sava, boats would be able to reach the Adriatic sea and the gulf of Venice. Rejoining the mainland network of waterways, using the east-west crossing of the northern part of Italy, it would have been possible to reach the Mediterranean by boat:

> [...] *revenant au Danube, et prenant sur la droite de Presbourg, l'on prend une rivière qui conduit à un intervalle de 10 lieus à ouvrir, lequel est traversé par les rivières de Drave et de Save, pour gagner la mer Adriatique ou golfe de Venise, qui communique à la Méditerranée* [...].

With regard to the mention of the connection between the Mediterranean and the Adriatic, it is not possible to establish whether the author intended the circumnavigation of the Peninsula, or whether he had taken into consideration the project by Ignatius Bonafous, implemented by Gaspard de Prony, to connect the two seas along the east-west axis using water and road junctions.

Although the project of the *Navigation Bonaparte* was never circulated by the official authorities, probably due to the fact that the author was not a member of the imperial technical groups, it did receive a fair amount of national attention, probably due to the author's connections in the publishing sector. Besides being present in several copies in various French archives, his project is often mentioned in documents of the time. Among others, a work drafted in 1825 by Philippe Jacques Fargès-Méricourt, lawyer and general secretary of the city of Strasbourg, is emblematic. In his detailed *Description de la ville de Strasbourg* [Fargès-Méricourt 1825, 207-212] – which expertly analyses the state of the city's morphological, architectural and urban aspects – Fargès-Méricourt mentions the link from the Seine to the Rhine envisaged by Saint-Germain. Explaining its utility and emphasising the fact that the city administration envisaged its effective construction, the author specifies: «*Canal projeté. Le canal du Rhin à la Seine, depuis Offendorf, dans le département du Bas-Rhin, jusqu'à Paris. Il paraît que l'on pense sérieusement à exécuter un projet utile, formé depuis vingt ans, et dont Marcel Prault Saint-Germain est l'inventeur*» [Fargès-Méricourt 1825, 207].

Prault de Saint Germain's project was never implemented. His distance from educational circles and the Napoleonic administration did nothing to favour the dissemination of his ideas. However, his analysis is very useful, as it paints a clear picture of the trend that prevailed at that time. At the heart of the Empire's transport and commercial strategies was the desire to create a transnational navigation network that was as efficient and extensive as possible. Equally important was the identification of strategic areas for which to plan an improvement of the local water networks.

The area of the Venetian hinterland, and Padua in particular, would have been an important centre for experimentation and would have represented an opportunity to create a preferential junction not only for communications between the east and west of Northern Italy, but also between the north and south of the Italian peninsula.

II.2.4 From Paris to Veneto: ideas, projects and the circulation of the models

With the fall of the *Anciens Régimes* and the administrative reorganisation of the countries conquered by the French forces, the need for new and efficient links between the various territories obviously became of the utmost importance. The existence of a well-developed national water transport network led Napoleon's engineers – and the Emperor himself – to envisage the possibility of creating a network of waterways that would cross and surpass the borders of the Hexagon, allowing the vast imperial territories to be united in a single large navigation system.

The exploitation and enhancement of the existing water network was an important element in the innovations introduced by the new administrative system and the École des Ponts et Chaussées based much of its work at that time on increasing its knowledge of hydraulic engineering and on the design of modern, efficient systems.

The tendency to strengthen the French national navigation network overlapped with the strengthening of the water resources of the nations it conquered, particularly in the northern part of the Kingdom of Italy. Italy was a very important manufacturing and economic centre for the imperial administration: fertile and rich in certain raw materials and manufacturing, the Italian peninsula boasted numerous ancient trade centres, be they ports (such as Genoa, Venice and Naples) or large markets (such as Turin, Florence and Rome). For this reason, and because of the existence of ancient trade routes, Northern Italy had forged countless relationships over the centuries with markets beyond the Alps, establishing an indissoluble link with the economic and urban growth dynamics of the French cities still under the rule of the French monarchs.

Napoleon's new administration, which was highly centralised, aimed to maintain its rule over Northern Italy: the French government seemed to isolate a series of precise strategic areas within the vast territory of the Kingdom, categorising them according to precise criteria of utility and identifying specific centres of action, which were more strategic than others.

Although Bologna was considered to have an ancient tradition of urban and territorial canalisation, the French government opted to dismantle the city's water networks, leaving only the major rivers, the Reno and the Savena, which flowed well away from the city centre, available for use. This is clearly demonstrated by a document dated 1811, when viceroy Eugène authorised the burial of the vital Navile canal, which became part of the city's underground waterworks [doc. n. 53 of the Documental Appendix]. The decision to bury it, interrupting the pre-existing system of connections that guaranteed

the city's link with Ferrara and, therefore, with the Adriatic, shows that there were undoubtedly different goals for each city and that the decisions made with regard to the water system were studied and planned on the basis of how useful they were at national and supranational level.

In the case of the Veneto-Adriatic area, the city of Padua was also home to an ancient tradition of canalisation, the result of work carried out by the engineers of the Most Serene Republic of Venice from the 15th to the 18th century. Despite having been built earlier, Padua's urban canals clearly represented a potential network of important connections for the French: by committing themselves, at great financial expense, to the recovery of the existing canals and to the implementation of their enhancement, the French seem to have wanted to make Padua, much more than Bologna, a sort of privileged communications hub. By exploiting its proximity to Venice, the ports of the Adriatic and the network of large rivers that surrounded it, the centre of Padua, with its locks, canals and mills, could have become the heart of an interchange system for the transport of goods and people, and could have been the urban systole in the network of water connections between Northern and Southern Europe.

In this scenario, a key role was played by the circulation of technical models, a dynamic which, at that time, underwent enormous development between the capital and Northern Italy, in a system of conceptual dualism between space and the unfolding of history [Delacroix 2002, 206][27]: Gaspard de Prony's and Mathieu Sganzin's trips to Italy, the precise planning of their itineraries, the knowledge acquired on the old hydraulic systems of the Veneto region [doc. n. 27 of the Documental Appendix] during their expeditions, the drafting of travel logs, containing the analysis of the water resources in the northern part of the country, the implementation of information and memos, the retrieval of works published on the works carried out in the Padua area, which was still under the rule of the Republic of Venice. All the actions, reactions and comparisons between these aspects are part of a precise dynamic of exchange, that of *transfert culturel*[28]: not a simple cultural exchange, but rather the creation of new models born of the re-interpretation of previous ones [Espagne 2013, 2].

[27] Christian Delacroix reports and comments on Bernard Lepetit's work as a «*historien de l'espace*»: «*Dans Espace et histoire, l'auteur appelle à croiser analyses de l'espace et du temps pour rompre avec une vision fonctionnaliste des systèmes spatiaux réduits à la combinatoire de leurs structures et pour privilégier leurs fonctionnements et leurs modifications dans le temps*».

[28] The concept of *transfert culturel* was developed from the 19th century onwards within the scope of studies of the cultural links between France and Germany. For an in-depth overview of the topic of *transfert culturel*, see, among others, the fundamental contributions made in 2002 by Christian Delacroix – in his interpretation of the writings of the *Carnet de Croquis* by Bernard Lepetit – in 2013 by Michel Espagne – which clarifies the historical significance of the concept of *transfert culturel* – and in 2003 by Michael Werner and Bénédicte Zimmermann – who address and analyse the dynamics of the so-called *histoire croisée*.

The debates within local governments and the technicians who travelled from one country to another to study and devise projects modelled on those already implemented elsewhere can be seen as cultural vectors that interacted not merely between two areas (France and Italy in this case), but between several centres, themselves the result of previous hybridisations [Espagne 2013, 3]. In this sense, the analysis of Paris and Padua under the leadership of Napoleon, the study of the plans to enhance the water networks and the role of Padua as the centre of gravity of the water connections, are configured as the basic plot of a hybrid history, where *transfert culturel* plays a key role: by placing itself in an absolutely transnational perspective, the exchange of cultural models relativises the concept of "centre" and considers the lability of the borders and national spaces of modern Europe.

II.3 A precedent of Ancien Régime*: the projects of Jean-Pierre Brullée*

II.3.1 A link between North and South. Projects at the service of the economy

The new, centralised state and administrative order, the strategic intentions dictated by the geographical location of the study cases and the dynamic of *transfert culturel* triggered by the technicians' trips to Italy placed the great hydraulic plans of the early 19th century in a purely European perspective, which aimed to link very distant territories, but which, at the same time, inevitably broke away from the planning approach taken in previous decades and centuries.

Within this framework, however, during that handful of years between the turmoil of the Revolution and the advent of the new consular order, the design activity of one of the aforementioned engineers of the École Nationale des Ponts et Chaussées, Jean-Pierre Brullée, emerged strongly[29]. It is undoubtedly worth taking a quick look at some of the projects developed by Brullée, as they seem to constitute an important design precedent and a valid operational model. Brullée's work was part of the extensive debate, launched in the late 17th century, on the construction of a new canal from Paris to Dieppe in Normandy, which would shorten the difficult navigation along the Seine by several days, giving the city, seat of the Kings of France, access to the North Sea.

Of all the projects developed and viewed over the decades, the most extensive and ambitious was undoubtedly that presented by Brullée himself. Although, as we know, it was never built, in 1791 the project was presented for discussion by the National Assembly. Considering the improvement of France's *navigation intérieure* to be particularly important in relation to the work of the governments of other European countries [doc. n. 16 of the Documental Appendix, Backouche 2010, 280-281], the Assembly judged Brullée's project to be useful and efficient. The route, which also included the construction of numerous quays in the city and was very similar to that of the future system of canals in Paris (and which most likely inspired Girard), envisaged the creation of a branch from the Marne (instead of from the Ourcq). Passing through what was then the municipality of La Villette, the branch would take two directions: one through the districts of Saint-Martin and du Temple to the Bastille area, and from there to the Arsenal and the Seine; the other, cutting through Saint-Denis and Montmorency, would reach Pontoise. From there, with another canal designed by Brullée, it would continue to Dieppe (Fig. 16).

[29] Jean Pierre Brullée (1733-1814) held various posts within the Ancien régime and later the Napoleonic administration: Ingénieur des Ponts et Chaussées, Constructeur de ponts et de canaux, Chargé de l'entreprise générale de la charpente des prisons et hôpitaux de Paris.

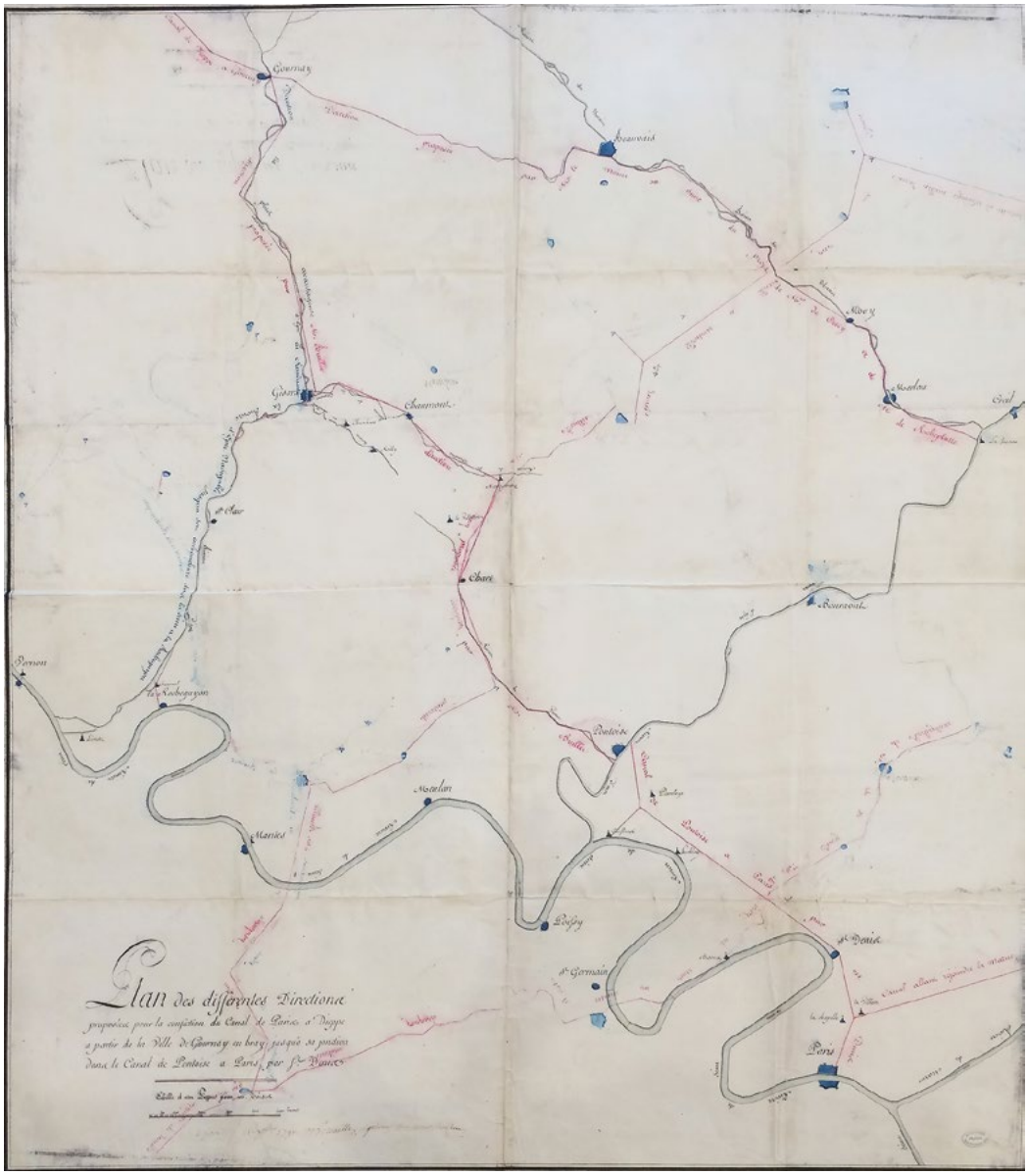

Fig. 16 - Jean-Pierre Brullée, *Plans des différentes directions proposées pour la confection du Canal de Paris à Dieppe*, 1791, drawing [ANFr, F/14 Travaux Publics, c.10117/A].

As a competent technician and an expert on the morphology of the territory of the capital, Brullée was already well aware of the advantages of a canalisation system coming from the north and divided into two branches, one running north-south and the other east-west. As well as ensuring the necessary water supply to the city and access to the urban port of the Arsenal via water, the new water structure would make it possible to reach the Conflans Sainte-Honorine area and Pontoise, travelling all the way to the North Sea on the water.

It was precisely this last aspect that proved to be one of the most important in the activity of Brullée who, even before Napoleon's exploits, the great conquests and the unification of the Empire, thought and planned on a strictly "European" scale. According to Brullée, and according to the Assemblée Nationale, the construction of a new canal with these characteristics would have enabled Paris, and consequently the whole of France, to compete with London and England's flourishing trade: touching the activities of merchants from half of Europe along its course, the new branch would have guaranteed trade links with Belgium and rich Flanders, with most of the other regions of the country and with the Ocean, which would have allowed overseas goods to arrive via the port of Dieppe.

This vision is clearly explained in a passage of the same document:

> *Le Canal de M. Brullée exécuté, Paris deviendra l'émule de Londres commerçante; il existera des relations toujours actives entre les habitants de la Capitale et des différents départements avec les nations étrangères. Dans un vaste bassin, sous les murs de Paris, seront rassemblées les marchandises nationales et étrangères, celles de la Normandie arriveront par la Basse-Seine; celles de la Flandre et de la Picardie par l'Oise; celles de la Lorraine et de la Champagne par la Marne; celles de la Bretagne, de l'Anjou, de la Touraine, de l'orléanais, et même de la Bourgogne, par la haute-Seine, dans laquelle se jettent l'Yonne, les canaux d'Orléans et de Briare, qui par leur communication avec la Loire, formeront pour la ville de Paris une jonction avec l'Océan: les productions d'outre-mer y afflueront aussi par le port de Dieppe* [doc. n. 16 of the Documental Appendix].

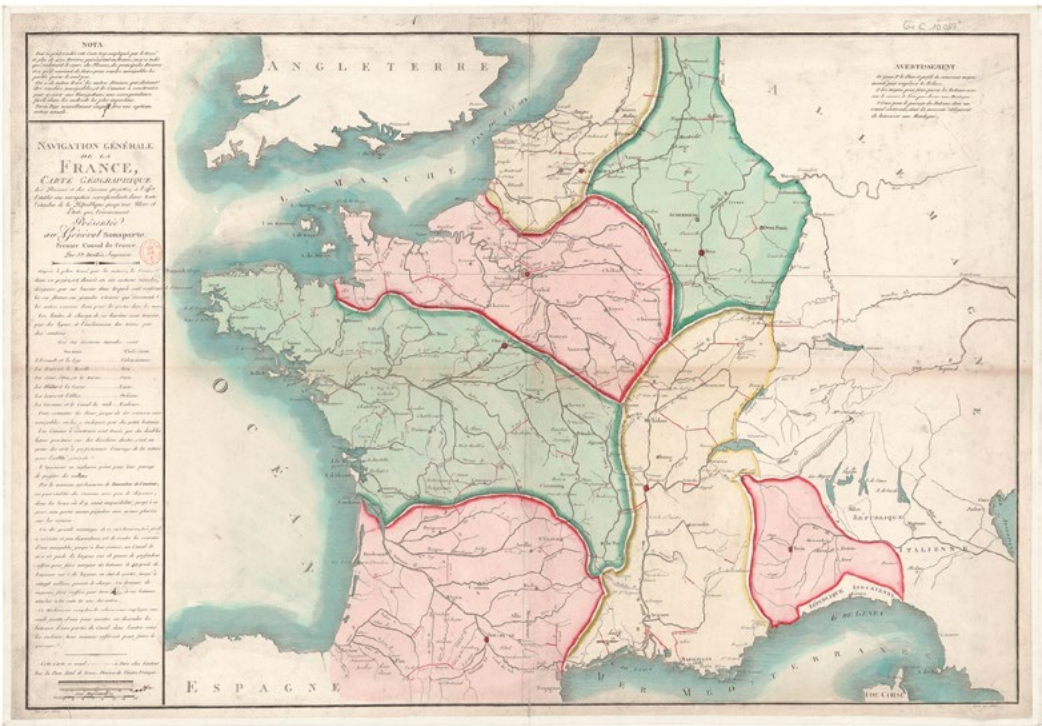

Fig. 17 - Jean-Pierre Brullée, *Navigation générale de la France*, first half of the 19th century, print [Gallica/BNF].

A few years after this discussion, and under the rule of the Consulate, Brullée was the author of another large-scale project: in 1802, he presented the then First Consul Bonaparte with a proposal for a new *navigation générale* of France. As can be seen from the study of the map, Brullée divided the country and its borders into seven sections, identifying the main city for each one (Valenciennes, Metz, Paris, Orléans, Toulouse, Lyon and Turin) and imagined the creation of new connecting canals, marked in red on the map (Fig. 17).
In addition to the complex route identified for the construction of the Canal de Paris, the engineer envisaged the development of a series of canals linking the country's main rivers and the tributaries of each one. The network imagined by Brullée would have guaranteed a wide margin of movement in water connections, which would have made it possible to move nimbly around the country, as far as the seas and, above all, the surrounding countries. Brullée's work is not only a model for the design of the Parisian canal system, but also an important precedent. With his large-scale vision, his prediction of fluid water connections within France and his vision of reaching all the neighbouring seas and countries – such as Belgium, Germany, Switzerland, Italy and Spain – by water, Brullée illustrates a very clear trend: formulating ideas for connections on a European scale, anticipating the planning strategies of the Napoleonic engineers, he ideally brought the neighbouring countries closer, thanks to the new connections, and laid the foundations for the birth of a possible "Europe of waters".

III

From Padua to *Padoue*:

a new water city

III.1 The fall of the Most Serene Republic of Venice and the new structure of the Kingdom of Italy

III.1.1 Bringing the royal waters under state ownership

The turmoil of the Revolution and the final collapse of the Ancien Régime had radically overturned the political order on which France had been based for centuries, leading to a substantial transformation of the administrative organisation of the modern state.

The first contacts between the Veneto region and Napoleon took place at the end of the 18th century, with the invasion of the mainland by French troops, led by a determined young Bonaparte, and the establishment of a revolutionary Jacobin and provisional municipality on 16 May 1797.

Following the brief period of the Consulate and Bonaparte's definitive assertion of power, his authority was about to expand to the four corners of Europe. On 2 December 1805, the third anti-Napoleonic coalition was defeated by the French troops and, on Boxing Day, Napoleon and Emperor Francis I of Austria signed the Peace of Presburg: the Veneto region, coming into the French orbit once again after a brief period of Habsburg domination, became part of the Kingdom of Italy.

Protected by the water and facilitated by the cooperation of its subjects, until the end of the 18th century the territories of the Most Serene Republic of Venice had experienced almost a thousand years of absolute political continuity, during which the city had remained largely indifferent to the demands of historical and technical evolution that had begun to affect Europe at the beginning of the 18th century.

But the splendours of the previous centuries were long gone: the Most Serene Republic of Venice, which had gradually lost its supremacy in trade, had gradually become impoverished and the supreme authorities of the Republic could no longer rely on the security of large sums of money. This was one of the reasons why the maintenance of the complex water network on the mainland, developed over the centuries by the technical experts at the service of the Republic, was gradually abandoned in favour of that of the Lagoon.

From the beginning of the fifteenth century Padua had a very close relationship with Venice: in 1405, the city on the lagoon had defeated the Da Carrara family in battle, conquering the ancient *Patavium* – which had already been under pressure from the expansion of the Visconti family at the end of the 14th century – and the rest of mainland Veneto.

Thanks to the administrative policies implemented by the Republic in the conquered territories, it was possible to regularise and enhance the city's ancient water network; this guaranteed the people of Padua better transportation of goods and passengers, greater use of the power supplied by the mills, a proper defensive base and good water supply to the city.

When the French first arrived in Padua on 28 April 1797, the Magistratura dei Sedici, which governed the city under the watchful eye of the Most Serene Republic of Venice, was abolished and the supporters of municipalism took office [Puppi, Universo 1982, 201]. On 31 December 1805, Prince Eugène de Beauharnais publicly announced the annexation of Venice and the Venetian States to the Kingdom of Italy following the Peace of Presburg [doc. n. 30 of the Documental Appendix]. After the experience of municipalism and the brief period of Habsburg rule, Padua too came under the direct control of France. The operations to bring the movable, immovable and natural resources of the territory under state ownership made it possible to transfer the rights to exploit the waters and the management of urban canalisations and diversions into the hands of the local and central administration.

This radical transformation in the age-old system of managing water resources made it possible to mitigate the effects of the old mechanism of private investiture over water, which regulated the exploitation of supplies and the production of power. Devolution to state ownership guaranteed the State not only the income from tolls, but also the possibility of directly controlling the situation of rivers, canals and mills and authorising their use for watering animals, supplying water or for private manufacturing activities.

Probably for the specific purpose of initiating the process of transferral to state ownership, in 1797 the then city surveyor Francesco Bacin compiled a census of the mills in the city and province. Starting with the mills in the Ponte Corvo and Ponte Molino areas – to the south-east and north of the city respectively – Bacin surveyed and registered their position, indicating the owners of each mill [doc. n. 17 of the Documental Appendix].

A year later, immediately after the end of the municipal experience, a Habsburg edict was issued on derivations: on 26 November 1798, the Austrian Empire, echoing the actions of the municipalists, hastened to outlaw all unauthorised water derivations for private use for «*irrigazione di Terreni, Risaje, o Maceratoi, o per qualunque sorta di Edifizio*» [doc. n. 21 of the Documental Appendix]. It was customary at the time for private citizens to excavate new diversions from existing ones when necessary. Without taking into account the disruption that these changes would cause to the normal navigation of rivers and canals, and relying on the lack of proper control by the part of local institutions, people had succeeded over the centuries in exploiting them for a wide range of private uses, such as agricultural irrigation or direct supply. With this edict, the imperial government undertook to introduce strict controls on the derivations and, above all, on the uses made of them.

A little more than a decade later, under Napoleonic rule, control over the derivations was once again the focus of government interest. On 15 October 1810, the then prefect of the Department of the Brenta, Bonaventura Zecchini (1769-1824), wrote to the Podestà of Padua asking him to comply with his request for a list of all the city's water derivations from major rivers and canals:

> [...] *mi trasmetta sollecitamente un elenco dettagliato di tutte le estrazioni d'acque che si fanno dai fiumi e canali percorrenti in codesto Comune per uso di Edifizj, molini, irrigazioni ed altro, non senza indicare la qualità degli Opifizj, ed irrigazioni a cui servono le acque distratte, ed il nome de' rispettivi proprietari. Si aggiungerà pure nell'indicato elenco i diritti di Pesca, se ve n'esistessero, e si compiacerà di accompagnarmi un esemplare delle Leggi, Editti e Regolamenti che dai cessati Governi furono emanati in diversi tempi sull'uso e contro l'usurpazione degli oggetti surriferiti* [doc. n. 52 of the Documental Appendix].

In addition to the name of the owner (which at that time was often the Royal State Property Office), the list also indicated the use of the derivations and the person or organisation which was exploiting them. The aim of the list was to monitor the usurpation of assets that were now considered public. The table, which was completed and returned, mentions the «*bocche dell'Alicorno*», the «*canale dell'Olmo*», the «*canale delle Torricelle*», the «*canale di San Leonardo*» and, perhaps the most important of all, the «*diversivo alle Porte Contarine*», which guaranteed the link to the «*canale delle Contarine*» [doc. n. 52 of the Documental Appendix].

Zecchini contacted the Podestà of Padua once more a few months later, on 21 February 1811, asking for an account of the number of mills in the Ponte Molino area – north of the city – and the names of their owners. A specific table was then produced to identify the number of mills located on the Ponte Molino stating that there were twenty-six mills [doc. n. 54 of the Documental Appendix].

A few days later, on 6 March 1811, Zecchini asked the Podestà to draw up a new table with a detailed list of how the existing rivers and canals were used in the territory of the Department of Brenta, which covered more or less the area that is now the province of Padua.

The copy of the table found at the State Archives of Padua is unfortunately not complete, but it does contain some important information. In addition to the indication of the Canton, the Municipality, the Section in which the river or the canal was located, the name of the owner was requested again, along with the use made of the waters, apart from navigation (which could be for mills, buildings, maceration, fishing, irrigation), and, above all, specification in the remarks section of whether the aforementioned «*uso delle acque viene fatto in un Fiume o Canale* [...]*, il nome del Fiume o canale ed il suo corso*» [doc. n. 55 of the Documental Appendix].

The existence of this type of document, while partly incomplete, clearly indicates that the French government intended to exercise careful control over the use of Padua's canals and diversions and to initiate modern management of the existing water network.

Thanks to the transferral of the waters to state ownership and the new system of control and management of water resources, the new government would have had a clear picture of the old navigation and supply network. This would have made it possible not only to plan maintenance and renovation, but also its expansion, with a view to developing the navigation network on a national and international scale.

III.1.2 *La navigazione si considera sempre essere l'oggetto principale*[1]

By its very nature, the water system of the Paduan territory was highly complex and must have appeared so to the high officials of the French government. The ring of water that surrounded the city centre, thanks to the contributions of the Bacchiglione and Piovego and the secondary branches that extended throughout the entire central urban area (Fig. 2), had guaranteed the city's subsistence over the centuries: a water supply sufficient to meet the needs of the inhabitants, the possibility to install a large number of economic and manufacturing activities – such as milling, tanning and the processing of textiles – and, above all, an efficient transport system for goods and passengers.

The ring system with its derivations, assisted by the connection of the Brentella canal between the Brenta and Bacchiglione, made it possible to cross the city both north-south and east-west: this guaranteed excellent permeability of the city centre, the possibility to use the quays and also to provide areas for depositing and storing goods, whether or not they were bound for Venice.

The smooth navigability of the city's canals had always been a priority of the Venetian magistracies, as is quite clearly demonstrated by a document drawn up by the Collegio dei Savi ed esecutori alle acque of the Republic. At the end of the fifteenth century, the Venetian magistracies were concerned that there should be a constant arrival of timber, a precious and indispensable material for the very survival of the city, from Bassano to Venice. The goods that descended from the River Brenta usually passed through Padua's Naviglio Interno, where part of the material was unloaded, before proceeding to the Piovego and continuing their journey to the Lagoon.

On 30 July 1494, the Doge Agostino Barbarigo asked for urgent measures to be taken to facilitate the navigation of the Naviglio – compromised and slowed down by the excessive activity of the mills, which lowered the water level – so that «*con tal modo non si renda innavigabile* [...] *acciò a le dette Legne da fuoco et detti Legnami da Lavoriero nel medesimo istante possano passare*» [doc. n. 1 of the Documental Appendix].

Regardless of the interests linked to the preservation of Venetian splendour, it is quite clear that the proper navigability of Padua's river and canal system was of primary importance. Even for the Most Serene Republic of Venice, which also received substantial income from milling activities, the navigation of the canals was an absolute priority, to which the albeit profitable activity of the mills could be subordinated.

When Padua, together with Venice and Veneto, became an integral part of Napoleon's Kingdom of Italy, the attention paid to the navigability of the city's canals and river system became even more important.

The aim of strengthening the French navigable water *réseau* was in fact to extend it to the rest of the Empire's territories, first and foremost Northern Italy, particularly the

[1] Cf. doc. n. 35 of the Documental Appendix.

Veneto area. Padua in particular, with its old but efficient system of rivers, canals, locks and diversions, was undeniably a centre of interest. Due to its central position in relation to the urban centres of the north and south of the Kingdom and its proximity to the sea – and therefore to the ports on the Adriatic – Padua potentially represented a strategic junction: the correct and efficient navigability of its system of waterways was therefore not only logistically but also militarily useful for Napoleon's government.
This is quite clear from a document dated 1806 containing an order from viceroy Eugène de Beauharnais himself. In the *Regolamento per la navigazione e per la custodia e conservazione di porti di mare*, published on 20 May 1806, within the *Bollettino delle Leggi del Regno d'Italia*, it Is stated that

> *la navigazione si considera sempre essere l'oggetto principale a cui servono i fiumi ed i canali navigabili. Tutti gli altri avvantaggi che possono ottenersi, deviandone le acque, a applicandole ad altri usi, si considerano sempre subordinatamente a quel primo fine* [doc. n. 35 of the Documental Appendix].

As had happened at the end of the 15th century, once again and with even greater impact, the navigability of rivers and canals took precedence over the rest of the possible uses of derivations, whether they were involved in manufacturing or simply aimed at crop irrigation.
The rapid crossing of the city by water was of fundamental importance to the new government, which probably saw it as a great opportunity not only in terms of international connections, but also locally in the necessary transport of goods, provisions and the sick.

III.1.3 Military use of the city's canals

In the French government's plans, ensuring good navigability of the city's major rivers and canals served a dual purpose: one was civil – related to the transport of goods, international connections and manufacturing activities – and the other was military – related to the transport of foodstuffs, troops and often the sick.
In this sense, being able to guarantee a good level of use of the urban canals was essential, as it made it possible to rely on rapid connections not only on a territorial scale, but also between neighbouring towns.
During the period of the provisional municipality, with the quartering of troops engaged in the fight against the Hapsburgs, Padua had witnessed a sudden increase in the military presence in the city. In addition to the city's residents, the troops too would have benefited from the use of the water network, which would have ensured the watering of the horses, the widespread distribution of foodstuffs for the animals and soldiers, and the transport of the wounded to hospitals in neighbouring towns.

One of the first traces of this use of water dates back to 1797: on 2 August of that year, the General Military Department wrote to the Department of Water and Rivers reporting a request made by the then Gastaldo dei Barcarioli[2] of Padua, Guerino Scarfi. The Gastaldo requested that the water intakes of buildings overlooking the canal running from Padua to Este be closed, to facilitate the transport of wounded French soldiers to hospitals in the southern part of the region [doc. n. 18 of the Documental Appendix].
In response to this request, a few days later, on 14 August, the municipal government of Padua ordered residents to temporarily suspend the use of intakes in the areas along the Este canal, in accordance with a formula that the current historical period leads us instinctively to identify with a curfew: from midnight until sunrise [doc. n. 19 of the Documental Appendix]. This interruption would have ensured the supply of water to the buildings during daylight hours, without preventing the transport of the wounded to the various hospitals at night.
Like the Este canal, the Bassanello, which ran south of the city, was also at the centre of attention of the military control bodies. On 14 November 1798, the Extraordinary Economic-Military Commission, set up following the sudden end of the municipal experience, asked the Water Department to ensure a greater contribution from the Bassanello water diversion[3], which was considered to be the preferred route for transporting oats to the troops quartered in the city:

> *Siete invitati a dare li vostri ordini, perché sia data l'acqua necessaria al Canale del Bassanello, onde possa arrivar prontamente in Città l'avena occorrente per uso delle truppe; non potendo le barche progredire per la mancanza dell'acqua medesima* [doc. n. 20 of the Documental Appendix].

It is therefore evident that the presence of a capillary water network, such as that in Padua, was a source of numerous benefits for the new French supremacy. Although morphologically and technically very different from the homogeneous water *réseaux* of the cities beyond the Alps, Padua's water system was a potentially strategic urban, territorial and international transport network.
Padua's water system made it an excellent junction for communications from the east to the west of the Italian peninsula and from the north to the south of the Kingdom, allowing easy access to the Adriatic without having to go through Venice. As had been attempted in Paris with the construction of the branch of the Ourcq, the aim in Padua was to alleviate pressure on the main rivers, which were becoming increasingly dangerous to navigate and whose delicate banks were struggling to resist their age-old

[2] The term "Gastaldo", which can be traced back to medieval times, was used to designate the representative of the guilds of the arts founded during the communal period. In this case, the Gastaldo dei Barcarioli was the spokesman for the guild of boat owners who transported people and goods.

[3] This derivation is probably identifiable today with the so-called Canale di Battaglia, which flowed southwards from Bassanello to the Canale di Este.

courses. At the same time, the flow rate of the two rivers and the conformation of the urban diversions continued to subject the city, as in previous centuries, to constant hydraulic problems and flooding. The damaged banks, the fields to be irrigated and the continuous opening of private water intakes made the system increasingly fragile and costly to maintain. Nevertheless, the importance of preserving its functionality would remain one of the priorities of the engineers and the French government.

III.1.4 The Consorzio degli Orti di Vanzo

Padua had been fighting a battle against floods and breaches of the riverbanks, which poured water violently into the urban canals, for almost as long as anyone can remember. From 1750 onwards, projects to control the water network were drawn up more and more frequently, resulted in operations of limited scope to alleviate the rivers or in more structured plans.

In the case of Paris, the problems to be faced with the construction of the new system of urban canals were mainly related to the supply of water to the city on the one hand, and the reduction of the transport load on the Seine on the other. Slow and dangerous, navigation on the main river did not guarantee rapid and efficient arrival and departure flows, and the construction of the new system would have made Paris a major transport hub.

In the case of Padua, the French government was faced with issues that were in some ways very different from those in Paris. On one hand, the priority was undoubtedly to preserve Padua's water network as it had been structured, strengthening it and exploiting it as a hub in the navigation network of the north of the Italian peninsula; on the other hand, the frequency of river floods and consequent flooding often made the city's network of canals unusable, blocking the normal flow of transport.

Although elsewhere, such as Bologna, the viceregal government had decided to partially bury the urban derivations – cutting the connection with the Adriatic and thereby saving costly technical work – no burial proposal was made for Padua. Despite the fact that they would solve the problem, burial works were not taken into consideration for the centre of Padua, where solutions that would solve the problems of flooding but still allow the city to be crossed by water were chosen.

As early as 1798, when the municipal government ceded power to the new Austrian order, it was noted that the beds and embankments of the canals outside and inside the city were severely damaged by flooding, the passage of boats and the daily use made of them by the people of the city.

Consequently, on 11 December, the then deputies Contarini, Erizzo, Grimani and Querini asked people to be more careful in their use of the riverbanks:

> *che d'ora innanzi non vi sia chi faccia discendere, ed ascendere cavalli nel fiume, se non per le Beverade* [...], *che le Lavandaje non smuova nella più minima parte i Sassi posti a Scogliera* [...], *ne' alterino la forma delle Arginature* [...], *che gli Artefici Tagliapietra* [...]

> *non abbiano a gettare le scaglie risultanti dai Lavori loro nello stesso, cagionando con ciò degl'imbonimenti* [doc. n. 22 of the Documental Appendix].

However, it was not only the flood-damaged banks that were a problem for the proper use of the city's water system. The flooding of the surrounding land, especially that to the south of the city, created numerous problems for the owners of that land and made further use of the diversions that ran through it difficult.
In order to carry out land reclamation operations quickly, to lighten the economic burden of the operations and to be able to keep the canals usable without burying them, the Prefecture of Brenta and the General Directorate of Water and Roads approved a provision in 1811 under the name Costituzione del Consorzio degli Orti di Vanzo. The provision imposed the creation of a consortium, endorsed by the owners of the land located south of the city within the walls, in the area between the Alicorno, Porta di Santa Croce and the Ponte Corvo and aimed at managing high water levels and crop flooding. The law invited people to

> *raccogliersi in società consorziale* [...], *sotto il nome di Consorzio degli Orti di Vanzo, tutti i possessori dei terreni compresi fra il Canale dell'Olmo, le cortine dei Bastioni Ghirlanda ed Alicorno fin oltre alla Porta di Santa Croce e il Canale delle Bovette dell'Alicorno stesso, che va ad irrigare l'isola del Prato della Valle* [...] [doc. n. 60 of the Documental Appendix].

The aim was to

> *asciugare con facile scolo tutte quelle campagne e prati i quali costituiti in situazione assai bassa, vanno in gran parte dell'anno coperti dalle acque con notabile pregiudizio della forza produttrice di quelle terre e della costituzione atmosferica di que' contorni* [doc. n. 60 of the Documental Appendix].

In this way, the productive forces of the agricultural land were protected by speeding up water drainage activities and the State would not be forced to undertake reclamation and burial of the city's canals, limiting expenditure and keeping the entire network of urban derivations usable.
The provision was actually applied when the Second Habsburg Domination had already governed the city for almost a decade: the Royal Provincial Delegation of the Lombardy-Veneto Kingdom, in the person of Simone Stratico[4], then Royal Councillor Delegate,

[4] Simone Stratico (1733-1824 or 1829), a Dalmatian from Zadar, with a medical and philosophical background, succeeded Giovanni Battista Poleni as Chair of Mathematics and Navigation at the University of Padua and was subsequently called by the Napoleonic government to teach navigation and physics at the University of Pavia. His knowledge of hydraulics and navigation earned him numerous roles in the French public administration of the Kingdom of Italy, for which he was Inspector General of Bridges and Roads (the equivalent of *Inspecteur Générale des Ponts et Chaussées*). Thanks to his experience in the army and in the French technical ranks, and despite his democratic ideas which made him leave the University of Padua, Stratico was able to continue his activities even during the Second Habsburg Domination, when Francis I awarded him the title of Professor Emeritus of the Universities of Pavia and Padua and

issued the municipal deed on 3 July 1822, specifying that the provision had already been approved on 26 February 1811 by the authorities in power at the time [doc. n. 60 of the Documental Appendix].
Although this aspect cannot establish an effective technical and administrative continuity between the French and Austrian governments, it is nonetheless helpful in documenting, to some extent, the actual strategic importance of Padua's water network: in the 1820s, the city's water network was still structured as it had been at the beginning of the century and was clearly still used for navigation on both an urban and territorial scale.

Royal Councillor Delegate of the Royal Provincial Delegation of the Lombard-Veneto Kingdom; for information on Simone Stratico see, among others the contribution of Didi Salghetti Drioli – edited in 1991 – and of Attilio Maggiolo – edited in 1983.

III.2 1805: annexation of the Veneto States and birth of the Dipartimento della Brenta

III.2.1. Veneto "water region": cultural identity, society and economy of the water city

With definitive annexation to the Kingdom of Italy in 1805, the French Empire found itself including a vast territory in its possessions, including the entire area occupied by the provinces in the Veneto region.

Crossed by numerous major rivers – the Po, Adige, Brenta, Piave, Bacchiglione and Sile, which flowed into various parts of the Adriatic or directly into the lagoon – and by urban and territorial canalisations derived from the major watercourses, the Veneto-Adriatic region had based the organisation of its economy, trade and social relations between the population on the presence of water.

In Veneto, the route taken by the waters was an essential component in the construction of the natural and anthropic landscape: even today, we can see cities such as Venice, Chioggia, Bassano, Treviso and Padua no longer as "urban anomalies", but as possible settlement paradigms [Zucconi 2004, 88].

In the words of anthropologist Vito Teti, water can be seen as a powerful factor in shaping identity, a unifying element, symbolic material for entire civilisations, a decisive marker of the reality of the representation of the different worlds in which people live [Teti 2013, XVII].

As also specified by Daniela Zumiani, Veneto's rivers had always been sacralised natural elements, linked to the place where they flow, so much so that they sometimes constitute the most identifying territorial character [Zumiani 2016, 325].

Padua, Bassano, Treviso, Rovigo and Verona are cities that were born close to one or more rivers, which it possible for them to grow, and their interaction with these rivers resulted in the development of a series of typical and easily recognisable specificities: an Arcadian and picturesque river landscape – widely represented between the second half of the 18th century and the second half of the 19th century by Italian artists, such as the Friulian engraver Sebastiano Lovison[5], who took up the matrices of caprices of Flemish origin –, the small city ports, the embankments, the riverside walkways, the bridges, the close similarities with Venetian landscapes. It could, therefore, be said that the presence of water is essential to convey unequivocal specificity to a place [Vallerani 2004, 92].

As well as being an intermediate link between Bassano and Venice via the River Brenta, Padua was also the hub of the connections between Venice and Vicenza: via the

[5] Sebastiano Lovison (1775-1845) was a very active engraver in the Bassano area, linked to the flourishing activity of the famous Remondini family of printers from Bassano. On the life and activity of Lovison, see the contribution of Valerio Rossitti edited in 1981; on the activity of the Remondini family, see the contribution of Mario Infelise edited in 1990.

Bacchiglione, the latter received fish and vegetables from Venice and sent products from the interior to the lagoon for export and foreign trade [Bonarrigo 1992, 57].
Rovigo, already very close to the towns of Emilia and near the orbit of Ferrara, had also managed to secure connections with the rest of the Veneto area: thanks to a branch of the Adige, the Adigetto, the centre of Rovigo was connected to the west with Verona and to the east with the Venetian lagoon.
Last but not least, Treviso, thanks to its three urban branches which flowed from the Botteniga into the Sile, was able to transport the raw materials produced in the city to Venice, as far as the Sacca della Misericordia, on the northern fringe of the city, to the *fonteghi* of Rialto and the ovens in the Sestiere di Castello district, by boat (crossing the lagoon near Torcello and Burano).
The water network was one of the elements that most clearly identified the cities of the Veneto region: such a uniform and widespread presence of water resources meant that, over the centuries, the inhabitants had honed various technical skills related to water management, such as those concerning irrigation, the construction of bridges, ports and boats and, above all, flood defence.
Water for drinking, washing, defending, generating energy. Water for transporting raw materials and culture: all these utilitarian aspects of water, which were an essential component for the survival and economic wealth of cities and their inhabitants, ensured that every urban centre had not only a small port – almost always called *Portello* and accessed through an opening in the walls – but also, and above all, an efficient and extensive urban water network.

III.2.2. The old configuration of Padua's water system: Brenta, Bacchiglione, Tronco Maestro and Naviglio Interno

Located in the middle of the plain, the city of Padua began diverting water from the major rivers in around 1100, working on the Brenta, which ran north, and the Bacchiglione – the ancient Retrone – which ran south along a riverbed abandoned by the former.
When their rivals from Vicenza diverted the River Bacchiglione at Longare in 1139, with the locks of the Bisatto canal, and left the city "dry", the Paduans decided to become more independent in terms of water supply and carried out a series of important operations. In 1143 they closed off the Brenta at Stra, causing the water level to rise. This resulted in the flooding of the city's ditches by the crossing of the Brenta, which took the name canale del Piovego in 1209. In 1195 the Bacchiglione was rebedded from Bassanello to the Specola area and, lastly, in 1314, the Brentella canal was dug. This not only connected the two major rivers but also allowed a considerable amount of water to be diverted directly from the Brenta as far as Brusegana. The Brentella enriched the poorer Bacchiglione on one hand but, on the other, it was unable to cope with high water levels, causing many floods in the countryside [Bevilacqua 1987, 52].

Following the construction of the water diversions and their implementation, the Paduan government realised that the water could be used not only for defence, but also for economic and transport purposes [Pili 1987, 157]. The Bacchiglione entered the city from the south, splitting into two and, thanks to its reliance on the Piovego and Brentella, feeding the two branches of water of the ring that embraced the urban structure: «*l'isola sulla quale si costituì la città duecentesca e proprio sul suo nuovo corso fu strutturato un sistema di terrapieni e fortificazioni a difesa dell'ansa che delimitava la città*» [Bortolami 1989a, 32].

From the second half of the 13th century onwards, the main trunk of the river Bacchiglione was branched off into a series of secondary canals within the city, using old dried-up riverbeds or creating new ditches. The watercourses acquired different characteristics: they defended the city, lapped against buildings, irrigated vegetable plots and gardens, and drove mills. Padua began to resemble a collection of small islands connected to each other by a multitude of bridges and delimited by *flumeselli*, *navigia*, *fossata*, *riverie*, *buseni* and *busenelli* [Bortolami 1989b, 32]. In this system, the two branches of the ring, the Tronco Maestro and the Naviglio Interno, constituted the "sutures" between the old heart of the city and the subsequent expansions [Panajotti, Vivianetti 1985, 52].

The historical configuration of Padua's rivers and urban canals and the part they played in the water supply and drainage cycle is clearly explained in a document dating back to the second half of the 18th century: the *Relazione del Pubblico Matematico*[6] *intorno alle acque di Padova*.

The author of this important document, dated 5 June 1766, was mathematician Giuseppe Rossi, commissioned by the Collegio dei Savi to examine Padua's water system and identify the reasons for the incessant flooding.

Thanks to the accuracy of the information presented, the report offers us a quite clear idea of the situation of rivers and canals at the end of the 18th century [doc. n. 8 of the Documental Appendix], a few decades before the inclusion of Veneto in the Napoleonic Kingdom of Italy.

Rossi specifies that the waters of the major rivers were channelled into the city through a canal, the Canale di Padova, and this is the name used today to identify the Tronco Maestro, which runs on the west side of the ring: «*Le acque, ch'entrano in Padova, sono quelle, che vi convoglia il Canale, che dal Bassanello prende il suo corso verso essa Città, e che chiameremo col nome di Canale di Padova*».

The Tronco Maestro was made up of the waters of the Bacchiglione and Brentella (those divided by the Bassanello from the waters of the Canale di Battaglia), the only waters that

[6] The figure of *Pubblico Matematico* corresponded directly to the Collegio dei Savi, but thanks to university education was above the *proti*; cf. the contribution edited by Michela Minesso in 1992, p. 5.

actually entered the city: «*e perciò tutti gl' interni Canali* [...] *non sono che diramazioni primarie, e secondarie del nominato Canale di Padova* [...]».
Then there were all the canalisations considered primary and secondary to the canal, all built in the first twenty years of the 13th century. The Pubblico Matematico mentions the four main ones in the document – the Bovetta dell'Alicorno to the south, the Olmo derivation, the Naviglio Interno, known as the canale di Navigazione, which closed the loop to the east, and the Bovetta di San Leonardo to the north – but does not mention other small derivations made for the private use of mills, gardens and religious communities. All the water from the canal that did not enter these derivations went to the mills of Ponte Molino and, upon falling from these, was reconnected to the derivation of San Leonardo, via which it all flowed out of the city through porta dei Carmini, to the north.
Running along the outer walls, the same waters were collected under the important junction of Porte Contarine. Part of it then continued to flow into the Naviglio Interno, while another part ran as far as porta Porciglia and branched off into two canals, the outer Piovego, which ran eastwards, and the inner San Massimo, which ran southwards. All the water from the diversions to the south of the city was collected between the Porciglia gate and the San Massimo canal and conveyed outside the city into an old branch of the Bacchiglione, the Roncajette:

> *Nel tronco compreso tra Porciglia e le Gradelle di San Massimo si raccolgono tutte le acque delle tre bovette Alicorno, Olmo, e Torreselle, e così ingrossato esce dalla Città per le suddette Gradelle, ed entra dell'antico Ramo del Bacchiglione, ora chiamato Canale di Roncajette. A Bovolenta si scarica nel Bacchiglione inferiore, vale a dire in quel Canale che principia all'Arco di mezzo della Battaglia e va liberamente a sboccare nella Conca di Brondolo.*

So there were two so-called «drainage» canals in this complex water system[7] – the Piovego to the north and the Roncajette to the south: «*Ed ecco, eccellentissimi signori, che due sono gli Scaricatori delle acque di Padova, uno il Piovego e l'altro il Canale di Roncajette* [...]».
At the centre of the whole system was the so-called Tronco Maestro: running along the west side of the city – under the S. Agostino, S. Giovanni, dei Tadi, San Benedetto, di Legno, del Molino and del Carmine bridges [Secco 1987, 163] – it was to form, together with the Naviglio – running from Specola to Porte Contarine, under the bridges of Santa Maria in Vanzo, Torricelle, San Lorenzo, Beccherie, Portelletto, Altinà, Eremitani, San Tommaso – and the Alicorno branch to the south, an urban node of fundamental importance, the real core of the city's water network. All the other branches

[7] In the jargon of hydraulic sciences, the term *scaricatore*, meaning drain, was used to refer to those structures and canals used exclusively for the outflow of water from the city, useful in the normal cycle of supply and drainage and indispensable in the event of floods.

were enriched by the Tronco Maestro, in a complex system of supply, generation of power and drainage developed over the centuries.
Besides being indispensable for the supply of water, the system was obviously navigable: it was this intricate network that the French conquerors saw, with its peculiar morphology but exceptionally efficient operation. Padua proved to be a true "water city", a key interchange hub, which the French would seek to preserve, strengthen and control.

III.2.3. Ingegneri di acque e strade and Magistrato centrale alle acque: the establishment of the new authorities

The territory annexed to the Empire was huge, still subdivided into provinces, according to an arrangement that reflected the age-old administrative structure developed by the Most Serene Republic of Venice for the so-called Stati da terra[8].
Incorporated into the French administrative system – like the holdings in the western part of the Italian peninsula (the so-called Pays Annexés) – the territories in the Veneto region were almost immediately divided into Departments. The Departments were independent administrative units, with supervisory bodies and prefectures of reference (which introduced the figure of the Prefect into the Kingdom of Italy), and all had a capital city.
A decree issued from Saint-Cloud on 29 April 1806 made provision for the transformation of the provinces of Venice, Padua, Vicenza, Treviso, Udine and Belluno into Departments, retaining their existing administrative borders. Venice became the capital of the Department dell'Adriatico and Padua that of the Department della Brenta [doc. n. 33 of the Documental Appendix].
With a few exceptions – such as the Ligurian department degli Appennini and the departments of the French Kingdom of Naples – all the administrative units of the Pays Annexés and those of the Kingdom of Italy were named after the most important river that ran through them. Once again, water was seen by the French as a geographic component of fundamental importance, even when it came to the administrative management of territories.
The following year, a circular issued by the Minister of the Interior Antonio Aldini (1755-1826) decreed that the ex-venetians states incorporated into the Kingdom of Italy would be divided into seven departments – Adriatico, Bacchiglione, Brenta, Istria, Passariano, Piave e Tagliamento – and that these would, in turn, be divided into

[8] The territories of the Venetian Republic were divided into three large areas: the Dogado, which corresponded to the narrow coastal strip which constituted the Duchy of Venice in ancient times and which ran from the Venetian lagoon to that of Grado; the Stati da mar, which were all the maritime holdings of the Republic: Istria, Dalmatia, Albania, Morea, the Aegean islands, Crete and Cyprus; the Stati da terra, on the other hand, were all the mainland holdings, organised into *reggimenti* of provinces and including the whole of Veneto, almost all of Friuli and part of Lombardy, with the provinces of Bergamo, Brescia, Crema, Cremona and Lodi.

districts and cantons. The Department of Brenta, with Padua as its capital, comprised the «*circondario esterno*», or outer district, and, according to the document, had a population of 50503 [doc. n. 46 of the Documental Appendix]. The department was made up of the Distretto di Padova, with the cantons of Padua, Teolo, Piazzola and Battaglia, the Distretto di Este, with the cantons of Este, Montagnana and Monselice, il Distretto di Piove, with the cantons of Piove di Sacco and Conselve, and the Distretto di Campo San Piero, with the cantons of Camposampiero, Cittadella and Mirano.

The Viceregal and Imperial governments found themselves, possibly for the first time, managing a territory that was extremely rich in water, but also very complex in terms of its morphology: on one hand there was Venice, with its delicate balance of canals, basins, the lagoon, its shores and the open sea; on the other, Padua, which, with its articulate urban water network and the major rivers surrounding it, was a strategic hub to be maintained and controlled.

The French government immediately realised that the question of water in Veneto was a special case and had to be addressed with specific measures and organisations.

Based on the French Service des Ponts et Chaussées, whose name it partially reflected, the new Corpo degl'Ingegneri d'acque e strade of the Kingdom of Italy was created in 1806. With a decree issued on 6 May, the Minister of the Interior, Aldini, announced the birth of the new organisation, which was to have the same duties in terms of control and design as its French counterpart. The institution, which depended directly from the Magistrature Dipartimentali di Acque e Strade and the Prefetture, was divided into five sections of engineers: the Ingegneri generali, Ingegneri in capo, Ingegneri ordinarj di prima and di seconda classe and the so-called Aspiranti [doc. n. 34 of the Documental Appendix].

A couple of months later, the creation of another new organisation was announced. It was to replace the old Collegio dei Savi ed esecutori alle acque and take over the tasks historically assigned to the Senate, the Consiglio dei Dieci and the Maggior Consiglio. Named the Magistrato Centrale d'Acque in Venezia, it opened on 25 July 1806 [doc. n. 36 of the Documental Appendix]. The Magistrato, which depended from the Direzione generale d'acque e strade di Milano and was directed by the Prefetto dell'Adriatico had been created to intervene in cases of urgency as a special organisation dedicated exclusively to the Veneto area, over which it had full jurisdiction. The organisation was made up of members from the Adige, Basso Po, Brenta, Bacchiglione and Tagliamento Departments – involving the provinces of Verona, Vicenza, Rovigo, Padua, Treviso and Venice – and was responsible for ensuring that the works of the department did not jeopardise the general water system and, above all, for monitoring navigation, while simultaneously defending the balance in the Lagoon.

One of the most interesting aspects of the Magistrato's work was that the approval of all works related to the water resources in the Veneto region – the lagoon, lidos, ports, rivers

and navigable canals – were subject to its prior approval. This meant that the Magistrato could exercise direct and careful control over the investitures, which had to be authorised by the organisation. Being a provisional and "emergency" organisation, it was dissolved on 6 May 1808, when its jurisdiction was transferred to the Direzione Generale di acque e strade di Milano [doc. n. 36 of the Documental Appendix].

It was during this period that the role of the engineer was more precisely defined, with engineering services becoming of primary importance during Napoleon's rule in Italy.

As we have already mentioned, in France, the engineers chosen by the Emperor for hydraulic works were all technicians trained at the École Polytechnique and specialised at the École des Ponts et Chaussées. Italian engineers were not part of such a complex and specialised training system, but Veneto undoubtedly boasted a solid tradition of knowledge in the field of hydraulics and studies in physics and mathematics related to water.

Those who we might call the "progenitors" of the Veneto engineers of the early 19th century had trained at specific centres of artisan and manufacturing development, most notably the Arsenal in Venice. It was at the Arsenal that a group of technicians with a wide range of skills, the *proti* [Minesso 1992, 3], including those specialised «alle acque» [Minesso 1992, 7] was trained and qualified.

At the end of the eighteenth century, shortly before the fall of the Republic, a course in *Studi fisico-matematici relativi alla navale architettura* was introduced at the University of Padua: one of the chairs of the course was Simone Stratico, who became Councillor Delegate of the Royal Provincial Delegation of the Hapsburgs in the 1820s, making the application of the act to the constitution of the Orti di Vanzo effective in 1822.

As we shall see later on, an important role in the hydraulic matters of the city of Padua was played by Antonio Maria Lorgna, a pupil – together with Stratico – of Giovanni Poleni, «*tecnico-docente universitario e consulente di Stato*» [Minesso 1992, 7]. It was Stratico, along with Paolo Frisi (1728-1784) and Leonardo Ximenes (1716-1786), who approved Anton Maria Lorgna's project dated 1777 for the regulation of the Brenta-Bacchiglione system.

The engineering school at the University of Padua was flanked by the Domenico Cerato School of Architecture, founded in 1771. There was also an independent course in architecture and engineering at the Accademia di Belle Arti in Venice from as early as 1767. Then there was the Military College of Verona, which was perhaps the institute that came closest to French engineering training. Its programme was directly inspired by that of the École Nationale des Ponts et Chaussées and Lorgna taught there, before becoming its director[9].

[9] On the subject of the education of engineers and architects in Veneto from the second half of the eighteenth century to the first half of the nineteenth, see, among others, Mazzi 2000, Mazzi 2002, Frank 2002, Serena 2002, Zaggia 2002.

The Napoleonic regulations on higher education, issued in the Kingdom from 1806, were preparing to establish a more detailed training programme for engineers, which, in keeping with the French tradition, required a fair balance between theoretical knowledge and technical skills. In this way, Veneto too would adapt to the training in engineering that had taken off with the birth of the École des Ponts et Chaussèes in France and, of the Polytechnics and the Higher Schools of Education in the rest of Europe.
In 1807, in Milan, which was joint capital of the Kingdom with Venice, viceroy Eugène de Beauharnais issued a decree dated 9 January establishing a Scuola delle acque e strade: the Director and Professors of the school would be appointed after the proposals of the Direttore generale d'acque, ponti e strade [doc. n. 44 of the Documental Appendix].
In terms of programmes and organisation, the school would be structured like the École des Ponts et Chaussées: this would make it possible to theoretically and practically align the activities of the technicians of the Kingdom of Italy with those of the French engineers and to create a direct "exchange" between the different areas of knowledge and models of intervention.

III.2.4. Gaspard de Prony: the Padua area as a place of study and experimentation

The study of techniques for the branching of Italian rivers, the channeling of canals in towns, and the construction and maintenance of embankments had always been the focus of French engineers.
After the annexation of the departments of Western Italy, the French government had to deal immediately with the fragile territory crossed by the Po. Plans for its maintenance, the improvement of its navigation and the creation of links to other rivers were some of the aspects on which the work of the Service des Ponts et Chaussées focused. Within the framework of these activities, an organisation dedicated to supervising the work to be carried out on the river course was created and given the name Magistrato del Po.
As we know, the navigation of the River Po was also the subject of part of the interests of a recurring figure, Gaspard de Prony.
Born in 1755 in Chamelet, a village not far from Lyon, he died in Paris in 1839. Prony had devoted his youth to studying mathematics, joining the Service des Ponts et Chaussées in 1776. The successful design of several bridges earned him a friendship with Gaspard Monge and, in 1791, his appointment as director of the General Cadastre of France.
A few years later, Prony, together with Monge and Lagrange, took charge of the organisation of the new École Polytechnique, where he and Lagrange held the chair of mechanics.
Already well known in the French scientific milieu, at the end of the 18th century Prony managed to forge a direct relationship with the young Bonaparte, who had returned victorious from the Italian Campaign, and, above all, with his influential wife Josephine. Thanks to his relationship with the future Emperor and to his undoubted technical and

scientific skills, Prony was appointed director of the École des Ponts et Chaussées in 1798. In this role, the engineer – who was also *inspecteur général* of the Service des Ponts et Chaussées – carried out numerous expeditions, both in France – where he worked mainly on the improvement of ports, the reclamation of the Marais Poitevin region in the Vendée and projects relating to the new Parisian canal system – and in Italy.

Prony had inspected the course of the Po by boat during a trip probably in 1805. According to the documents that have been found, the survey was performed very carefully. The engineer had «*parcouru le Po en bateau depuis sa source jusqu'à son embouchure dans l'Adriatique, visitant les deux rives et la partie inférieure des affluents de droite et de gauche*» [doc. n. 32 of the Documental Appendix].

In the same report, Prony also mentions plans to link the Po to the Stura and speaks of the existence of a plan to allow the Emilian branch of the Reno to flow into the main river. Prony's documents also include a project for the construction of a quarantine hospital in the Comacchio area, where, as we will see, plans had been made to build a new Adriatic port.

It was not only the contemporary layout of the area that attracted Prony's attention, but also the study of the ancient changes that had taken place along the shores lapped by the course of the River Po. The focus of the technician's research was the study of the shifting of the Adriatic shores in the areas occupied by the Po delta and the Venetian lagoon. Prony drew on the information supplied by ancient authors, whose publications he had found during his Italian travels, and supplemented it with data collected on site, enabling him to reconstruct a precise picture of the new water structure of the maritime and lagoon borders of the Veneto-Adriatic area.

In addition to the Po, the attention of the central government and its technicians was drawn to the entire river system in Northern Italy. Together with his colleague Mathieu Sganzin, Prony took part in several Italian expeditions, visiting almost all the annexed departments and those of the Kingdom. It was mainly in the north that the two engineers were able to best study the water system, its conditions and efficiency, and plan their conservation and enhancement operations.

On 27 July 1805, the year in which it is also possible to date the expedition along the course of the Po[10], from Milan, Prony announced his return from a water inspection mission that had lasted almost two months to the Minister of the Interior, Antonio Aldini (1755-1826). Setting off from the great Lombard city, the two technicians travelled by boat through Pavia, Mantua, Comacchio, Cavarzere, Ferrara, Bologna, Modena, Parma and Piacenza before returning to the then capital of the Kingdom. Prony immediately informed the Minister of the Interior of the viceregal project to set

[10] On the problem of dating, see also BIB. E.P.C., *Résultat de la visite du cours du Pô depuis ses sources jusqu'à l'embouchure du Tessin et du cours du Tessin depuis son embouchure jusqu'à Pavie*, c. Ms.1281: the document is dated 1805.

up a Corps des Ponts et Chaussées in the Kingdom of Italy: «*Le Vice-roi, que j'ai eu l'honneur de voir ce matin* [...] *m'a engagé en lire avec M. Paradisi le projet d'organisation d'un corps des Ponts et Chaussées à établir dans le Royaume d'Italie* [...]» [doc. n. 27 of the Documental Appendix].

As we know, the corps was actually created in 1806, modelled on its French counterpart, of which Prony was one of the most influential and respected members.

However, what is most interesting in the context of this analysis is that Prony, while not yet having ventured as far as Venice, quickly identified the balance between the water system in the lagoon and that on the mainland by examining the area of the province of Ferrara: «*tout le système hydraulique des états de Venise est lié à celui de la basse Italie [Royaume d'Italie] par les communications qui existent entre l'un et l'autre* [...]» [doc. n. 27 of the Documental Appendix].

The engineer from Lyon immediately realised that the Veneto-Adriatic area was characterised by an extremely interesting hydraulic complexity. He also identified the presence of natural and artificial water links and connections between areas that were already highly strategic for the French government in political and military terms.

Prony's interest is clearly expressed in a second document drafted as early as 28 July 1805: in another report to the Minister of the Interior, the engineer expresses his pleasure at finding such an efficient and technically refined system: «*On imagine combien le spectacle d'un pays et d'une ville qui n'existent que pour l'hydraulique doit avoir d'intérêt pour un ingénieur particulièrement adonné à cette science depuis 30 ans* [...]» [doc. n. 28 of the Documental Appendix].

During those same years, Prony, in his capacity as Director of the École, was working in Paris on the large-scale diversion of the Ourcq and on projects for navigability and connections between the capital and other areas of France. Collective expeditions to the various areas of the Kingdom were also useful to find material on the great projects of the past – knowledge of which could be partly reused in French projects – and to focus attention on the strategic area of Padua: «*J'ai profité de mon second voyage à Venise pour augmenter la collection des livres et mémoires que j'avais déjà formée, et je me suis procuré, entr'autres, les meilleurs ouvrages publiés sur les travaux hydrauliques de la Brenta*» [doc. n. 29 of the Documental Appendix].

The collection of books and publications compiled by Prony during 1805 and also later, thanks to lasting contacts with the University of Padua and local publishers, was included in the engineer's private collection, preserved today in the Library of the École Nationale des Ponts et Chaussées under the name *Fonds Prony*.

Evidence of this lasting cultural exchange is the presence in the *Fonds Prony* of two volumes published much later, in 1811: *Esperimenti e considerazioni sull'Ariete idraulico*[11]

[11] Cf. BIB. E.P.C., *Fonds Prony*, *Esperimenti e considerazioni sull'Ariete idraulico di Salvator del Negro*, 1811, c.4°34498.

and the reprint of *Memorie storiche dello stato antico e moderno delle Lagune di Venezia di Bernardino Zendrini*[12]. Professor of Experimental Physics at the University of Padua, Salvatore Dal Negro[13], author of the first volume, expertly illustrates the use of the hydraulic pump that he had developed, suggesting a series of improvements for water suction that were undoubtedly pertinent to Prony's work.

In the 19th century reprint of *Memorie* on the other hand, dedicated specifically to the viceroy Eugene de Beauharnais, Bernardino Zendrini[14] skilfully and precisely tells the story of the genesis and performance of the works carried out to regulate and reinforce the Venetian Lagoon, from 1300 to 1700 circa. With the aid of drawings and all the information available on the consolidation of the lagoon system, the diversion of the rivers that flowed into the Lagoon and the securing of the ports and island forts, Zendrini's work sheds light not only on the workings of the delicate balance in the lagoon but also on the close connections between the latter and the rivers on the mainland. The analysis focuses particularly on the events linked to the course of the River Brenta and the River Bacchiglione, which Zendrini mentions constantly in each of the eight books that make up the work.

Once again, French interest is quite clearly focused not only on Venice, but also on the mainland: the Padua area, the great rivers, flood management in the city and province, urban canalisations, its hypothetical river links at national level and with the Adriatic. The document entitled *Rapport et projets sur les Ponts et Chaussées (ans XII et XIII)*[15], already cited as a valuable source for the catalogue of water works carried out on national and international scale, contains a short but eloquent section on some projects developed by Prony and Sganzin during their stay in Italy in 1805.

The accent is placed on the project for the construction of a new port on the Adriatic. According to the plans, the new port was to be built in Comacchio, bypassing the Venetian territories, which had not yet been incorporated into the Kingdom of Italy, and creating a direct link with the sea and the southern departments of the Kingdom of Italy (corresponding to the present-day regions of Emilia Romagna and Marche). The project clearly receded into the background following the annexation of Venice to the viceregal

[12] Cf. BIB. E.P.C., *Fonds Prony*, *Memorie storiche dello stato antico e moderno delle lagune di Venezia e di que' fiumi che restarono divertiti per la conservazione delle medesime di Bernardino Zendrini*, 1811, c. 4°668.

[13] Salvatore Dal Negro (1768-1839) was a physicist from Murano. After studying law in Padua, where he graduated in 1796, he became assistant to Simone Stratico, before becoming professor of experimental physics and geometry.

[14] Bernardino Zendrini (1679-1747) was a hydraulic engineer from Val Camonica, which was then part of the Stato da terra of the Most Serene Republic of Venice. In 1700, Zendrini graduated in Medicine from the University of Padua. Interested in science and infinitesimal calculus, he moved to Venice in 1707. In 1720 he was appointed *Matematico sopraintendente alle acque, fiumi, lagune e ponti* and, in 1738, he worked for the Venetian Republic on the reconstruction of the murazzi, the blocks of Istrian stone cemented with mortar that defended the lagoon from sea erosion between Pellestrina and Chioggia.

[15] Cf. doc. n. 32 of the Documental Appendix.

state: «*Il a été fait un projet d'un port sur l'Adriatique à Comachio; mais la réunion de Venise au Royaume d'Italie rend ce travail d'une moindre importance qu'il n'était alors*» [doc. n. 32 of the Documental Appendix].

The existence of a plan to build a new port in the Adriatic is confirmed by another document dated 8 June 1805: two engineers, Rolland and Bauger, stationed in Ferrara by order of Bonaparte, write to the Minister of the Interior, agreeing on the need to create a new port along the Adriatic coast. They report that they have carried out an inspection of the Magnavacca area (now Porto Garibaldi area) together with their colleagues Stratico and Brandolini, with all four engineers being of the opinion that the construction of a new port complex was of vital importance: «[...] *avoir satisfaction de voir M. et M. les ingénieurs italiens partager notre opinion sur l'emplacement d'un port*» [doc. n. 26 of the Documental Appendix].

The analysis of these two documents shows clearly that reaching the Adriatic Sea by boat was an important issue for the French administration. It would have allowed not only a connection by sea with the southern areas of the Kingdom, but also the opening of a preferential corridor towards the eastern territories of the Empire. In this sense, the annexation of the *ex-Veneti* states and the possibility of crossing the Padua area would have undeniably facilitated access to the sea.

In the years following 1805, Prony travelled to Italy several times, exploring almost all the territories annexed to the Empire. Direct evidence of these trips can be found in the engineer's original travel logs. They reveal that Prony undertook a second journey between 14 August 1806 and 12 January 1807 travelling down the western side of Italy to Rome and then up to Venice along the eastern side, and a third mission between 18 November 1807 and 18 February 1808.

In the travel logs – soft notebooks with leather covers and fine paper – the engineer jotted down details about the areas he travelled through, alternating between short texts and drawings, and making note of the projects developed to improve the region's water supply (Fig. 18).

Prony also carried out a fourth mission in Italy, his *Mission de Rome*: from 7 October 1810 to 28 November 1811, the engineer stayed between Rome and the lower Lazio region, where he drew up extensive projects for the reclamation of the Pontine Marshes [doc. n. 40 of the Documental Appendix] [16].

After working on the Ourcq project, on improving French national navigation and strengthening international links, the Ecole and Prony arrived in Italy. Paying particular attention to the Veneto-Adriatic area, they studied its water history, found useful information on the major projects of the past, recovered books and publications and imagined enhancements and improvements to navigation and in the connections to the

[16] On the projects of the Service des Ponts et Chaussées in the Agro-Pontine area see, among others, the contributions edited by Cristiana Costanzo in 1999 and 2001.

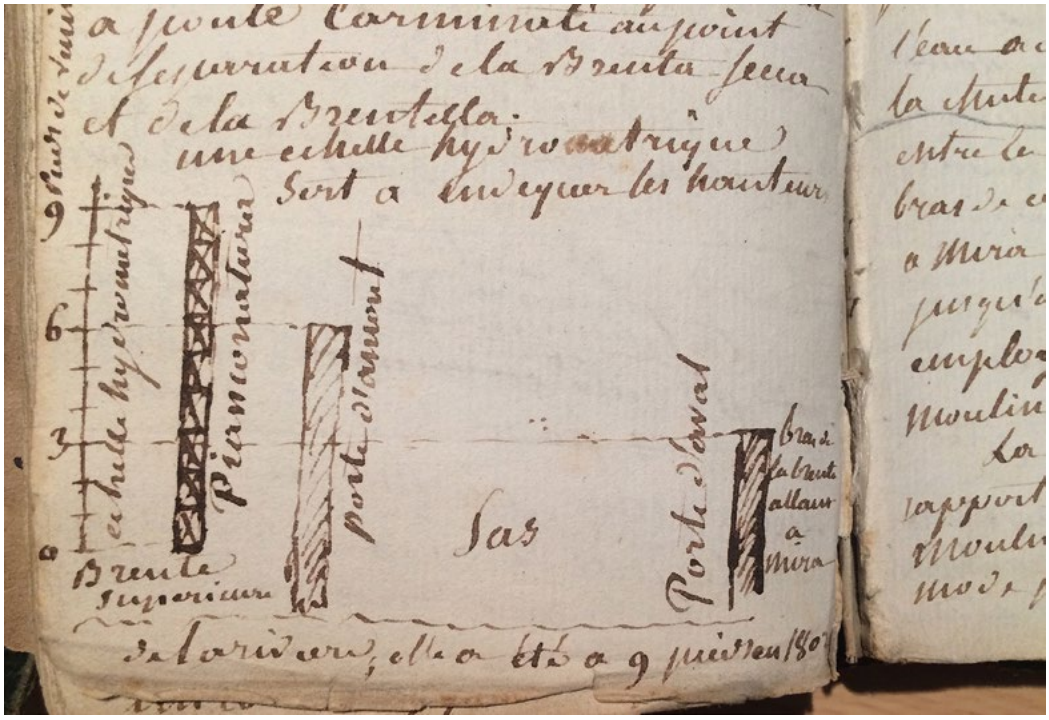

Fig. 18 - Gaspard de Prony, *Esquisse d'une écluse sur le fleuve Brenta*, 1807, drawing [BIB. E.P.C., Fonds Prony, Ms.1817].

seas and ports, making use of the experience gained in France. On his travels, Prony's work linked Italy and France – and especially Paris and the Veneto-Adriatic area – in the same dynamic of *transfert culturel* that can be seen both in the studies carried out and projects developed, and in the same ambitious vision of international water connections.

III.3 Padua, strategic hub of the Kingdom of Italy

III.3.1 A strengthened nucleus of links between the north and south of Europe

Already under the auspices of the Lion of St. Mark, Padua played a fundamental role in the management of water traffic within the territory of the Republic: the strategic position it enjoyed and its particularly complex but efficient water network made it the hub of trade and cultural exchange in the Veneto area.

The consolidation and excavation of the canals inside and outside the city, planned back in the 18th century, served not only to protect the city from the violent floods that plagued it and to make the manufacturing activities linked to the use of water – such as weaving, milling and tanning – more dynamic, but also to speed up movement within the urban structure and outside the city, towards the other towns in the Veneto region [docs. n. 3, 6, 7, 10, 14 of the Documental Appendix]. With this in mind, a plan was presented to the Magistrato alle Acque di Venezia in 1767. The plan comprised the «*operazioni che si rendono necessarie a condur l'acque della Bovetta Alicorno nel Canal di S. Massimo dietro alle mura di Padova a sollievo del fiume che viene dal Bassanello ed inonda la Città*» [doc. n. 9 of the Documental Appendix].

The external derivation of the Alicorno, which flowed south of the city, would have been created thanks to the construction of a lock with gates, modelled on the Contarine barrier. The new structure would have regulated the flow of water when the levels rose, carrying it to the new external outflow canal.

The rivers bordering the city to the north and south, the Brenta and the Bacchiglione, had also been the subject of requests for improvement and maintenance of their courses and embankments. The frequency of floods in the city depended on the structure of the two rivers, and made it impossible to exploit the water for the subsistence of the population and to maintain the flow of traffic.

In this context of local and continuous water-related planning activity, we can see how, even in the early years of the 19th century, Padua was to play an absolutely central role.

The engineers Prony and Sganzin had already had the opportunity to inspect the Northern Italian water network since 1805, focusing in particular on that of the Veneto-Adriatic area. The in-depth study of the lagoon system and the rivers that crossed the Venetian mainland was therefore functional not only to gaining further and older knowledge for use in French projects, but also, and above all, to having a clear idea of the water situation in the region.

Padua really seemed to be one of the strategic locations for the French government. Napoleon's plans to preserve and enhance the existing water system did not involve all the territories within the Kingdom. While the viceroy opted for a substantial burial of the canal in Bologna, which would have connected the city to the Adriatic and vice versa,

the exact opposite occurred in Padua. The French government seemed to implement all the necessary and indispensable solutions to control flooding, ensure the protection of land and people, and keep the water transport system functional and efficient.
At the beginning of 1807, in a letter dated 18 January, the Prefect of the Brenta Department, who was also President of the newly created Magistrato alle acque in Venezia wrote to the Podestà of Padua, requesting the immediate reconstruction of the «*tratto di strada di Torricelle fronteggiante il Convento di Santa Chiara, non essendo navigabile il Canale sopra cui scorre la detta Strada, frapponendosi il fabbricato dei Molini di Torricelle*» [doc. n. 45 of the Documental Appendix].
Outside the urban structure, however, there were water systems on a territorial scale which, on one hand, required maintenance and regulation in order to avoid the impact and violence of floods and, on the other, required improvement in terms of navigability to ensure a wider range of connections.
On 30 November 1806, the Inspector General of the newly created *Corpo di acque e strade*, the engineer Sanfermo wrote to the Prefect of the Department of the Brenta, asking for an allocation of expenses to carry out important work on the river network, which had been seriously damaged by the floods of 1806. Sanfermo wrote about the disastrous situation of the rivers in the Padua area:

> *Non v'ha Dipartimento che ne conti una cifra così ragguardevole, e niuno ve n'ha in cui la disorganizzazione sia giunta al segno cui portossi in quelli di Padova* [...]. *si diramano senza misura, ed il tronco e le braccia presentano ovunque un aspetto diverso* [...] *eguali nei generali, ma dissimili nelle parziali loro posizioni, forma e natura* [doc. n. 43 of the Documental Appendix].

The Inspector felt that the imbalance was due to the old plan to divert the Brenta and Bacchiglione rivers out of the lagoon in order to preserve Venice and keep it inaccessible, extending the course of the rivers and reducing their gradient.
In view of new floods in 1806, Sanfermo expressed his hopes that there would come «*un tempo in cui, o fosse necessario lasciare che la natura sì a lungo vincolata ripigliasse il primiero suo corso, o facesse duopo sovvertir questo piano, o sostituire uno novello* [...]» [doc. n. 43 of the Documental Appendix] in order to restore the course of the major rivers and canals to normal levels.
The need for a plan to regulate the rivers and make it possible to use the water network as a preferential link was reiterated in 1809 following a new wave of floods.
On 20 April, the chief engineer of the city of Padua, Letter, informed the Podestà that the cause of the flooding was probably related to the lack of a new plan to regulate the two major rivers:

> *due fiumi disorganizzati (il Brenta ed il Bacchiglione) che da tanti anni dimandano il loro regolamento, furono le tante, e tante, inondazioni passate, come lo sono le pesanti calamità in*

> *colpa forse delle molteplici discrepanti opinioni dei Progettisti, che turbarono i consigli delle governative decisioni* [doc. n. 47 of the Documental Appendix].

A few days later, on 29 April, Letter once again asked the Podestà of the city for men and means to organise new works to reinforce the embankments of the city's internal canals: «*per quanto riguarda i canali interni di questa città io devo interessare il di Lei zelo, Signor Podestà, affinché voglia somministrarmi i mezzi che indispensabilmente mi occorrono* [...]» [doc. n. 48 of the Documental Appendix].
Letter also specified the areas to be involved in the works:

> *- Nel tronco del Brenta-Bacchiglione alla destra dalla Porta Saracinesca al Ponte di Legno*
> *- Nel Naviglio di San Michiele alle Porte Contarine*
> *- Nel Brenta-Bacchiglione a sinistra dalla Porta Saracinesca sino al ponte di San Leonardo*
> *- Nel tronco stesso internamente al Ponte Molin, a sinistra tra i due Ponti dei Carmini*
> *- Nel Canale di Santa Sofia dal Ponte di Porciglia a quello di Santa Sofia*
> [...] [doc. n. 48 of the Documental Appendix].

The areas most affected were those of the southern branches and the Alicorno junction, and the northern area of the branches around Porte Contarine, the Ponte Molino area at the entrance to the Naviglio and Porta di Porciglia, to which the Santa Sofia canal was connected.
Between October and December of the same year, it was the Prefect who urged the Podestà to arrange works to protect the urban structure from flooding and allow the use of internal canals and links with the surrounding area.
In a letter dated 30 October, the Prefect asked for work to be carried out in the western part of the city, «*onde impedire ulteriori inondazioni della città*» [doc. n. 49 of the Documental Appendix]. A month later, on 6 December, the same prefect asked the Podestà once again to replace the gates of the locks on the city's western outer canal, from Porta Saracinesca to Porta Savonarola

> *perché sono fracide, e siccome è importantissima cosa, che in attualità di fiumana queste chiaviche debbano restar chiuse per lasciare la fossa della Città a solo uso di scolo interno della Città stessa, che tanto abbisogna di uno sfogo libero, e indipendente* [...] [doc. n. 50 of the Documental Appendix].

Solving the problem of the flooding of the great rivers was of crucial importance to the French government. On one hand, it was necessary to protect the territories of the province and the crops from the fury of the floodwaters, maintaining a good balance in navigation; on the other hand, it was necessary to preserve the balance of the canals inside the city, maintaining the water intakes needed by the population and guaranteeing a proper crossing and decent permeability of the city.
To this end, on 27 June 1811, with a decree issued from Saint Cloud, Antonio Aldini decreed the implementation of the plan «*per regolare le acque de' fiumi Brenta e*

Bacchiglione, presentato dall'ispettore generale Artico» [doc. n. 56 of the Documental Appendix].
The plan was essentially to regulate not only the two major rivers, but also their tributaries and diversions and was to be completed within six years under the supervision of an additional civil magistrate. This organisation, which would have been based in Padua, would have consisted of one representative from each of the three departments involved: Brenta, Bacchiglione and Adriatico, under the presidency of the Prefect of Brenta.
The direct intervention of the emperor in technical matters relating to the water resources of the empire's territories was nothing new. As we know, in the events linked to the approval of the project for the diversion of the Ourcq and for the new system of canals in Paris, it was Bonaparte's *tranchante* intervention that brought an end to the debate surrounding the development of the plan.
As far as Padua and Veneto are concerned, a few years before the decree on the implementation of the regulatory plan, Napoleon opted for the creation of an additional, special Commission of Hydraulic Engineers. The institution would be responsible for drawing up a major plan for water works in the Veneto area, aimed particularly at reconciling the water requirements in the lagoon area with those of the mainland.
With a decree issued on 28 July 1806, the emperor decreed as follows

> *Sarà nominata una Commissione d'Idraulici i più rinomati, la quale, previo l'esame de' piani esistenti circa i lavori d'acque da farsi nei Paesi Veneti, e sentiti tutti i Dipartimenti interessati, ci presenterà un piano generale di lavori, che coll'interesse di Venezia vada a conciliare quello di Terra ferma* [doc. n. 37 of the Documental Appendix].

It was probably thanks to the work of this commission that the plan to regulate the Brenta and Bacchiglione was drawn up and implemented in 1811. The Commission was responsible, among other things, for presenting the projects «*Per la rettificazione del corso della Brenta*» and «*Per i ripari alle inondazioni del Bacchiglione e del Retrone*» [doc. n. 37 of the Documental Appendix].
However, the most interesting aspect of this document, which was published in the *Bollettino delle leggi del Regno d'Italia* in 1806, is that the decree also asked the commission to design a new canal and to reopen an old one that had been closed:

> *II. La stessa Commissione ci presenterà pure i seguenti progetti:* [...] *Per l'escavazione di un canale navigabile fra l'Adige e il canale d'Este, cominciando da Albaré;* [...] *Pel riaprimento del Canale Bisatto* [...] [doc. n. 37 of the Documental Appendix].

The creation of the new canal, which, starting from what is now the area of Costermano sul Garda, would have connected the Adige to Este, would have made it possible to create a new direct link between Padua and Verona. From the centre of Padua, upon reaching Este, it would have been possible to travel up the Adige to Verona. Moreover, the reopening of the so-called Bisatto Canal, south of Padua, would have allowed the

controlled introduction of the waters of the Bacchiglione into the canals inside the city. Coordinated with the plan to regulate the Brenta and Bacchiglione, the opening of the two canals would have improved the city's accessibility and would have guaranteed the strengthening of its role as an interchange hub between the west and east of the region. This would have made it possible to reach Venice, to connect with the southern areas of the Kingdom and, above all, to have a new, useful outlet into the Adriatic.

Moreover, according to a memorandum issued by the viceregal seat of Monza on 24 October 1806, this Commission of Hydraulic Engineers was established in Padua, a city considered to be «*il punto più centrale delle ex-Provincie Venete*» [doc. n. 42 of the Documental Appendix], alluding not only to its geographic centrality but also its strategic importance.

The studies carried out by Prony on the water system of the Venetian mainland; recurrent projects for the maintenance of the Brenta and Bacchiglione and preventing the rivers from overflowing; operations to preserve the urban water network; plans to launch work on the *mise en place de l'eau* on an urban and territorial scale in Padua; the establishment of a special Commission based in the centre of Padua: all these aspects helped clarify

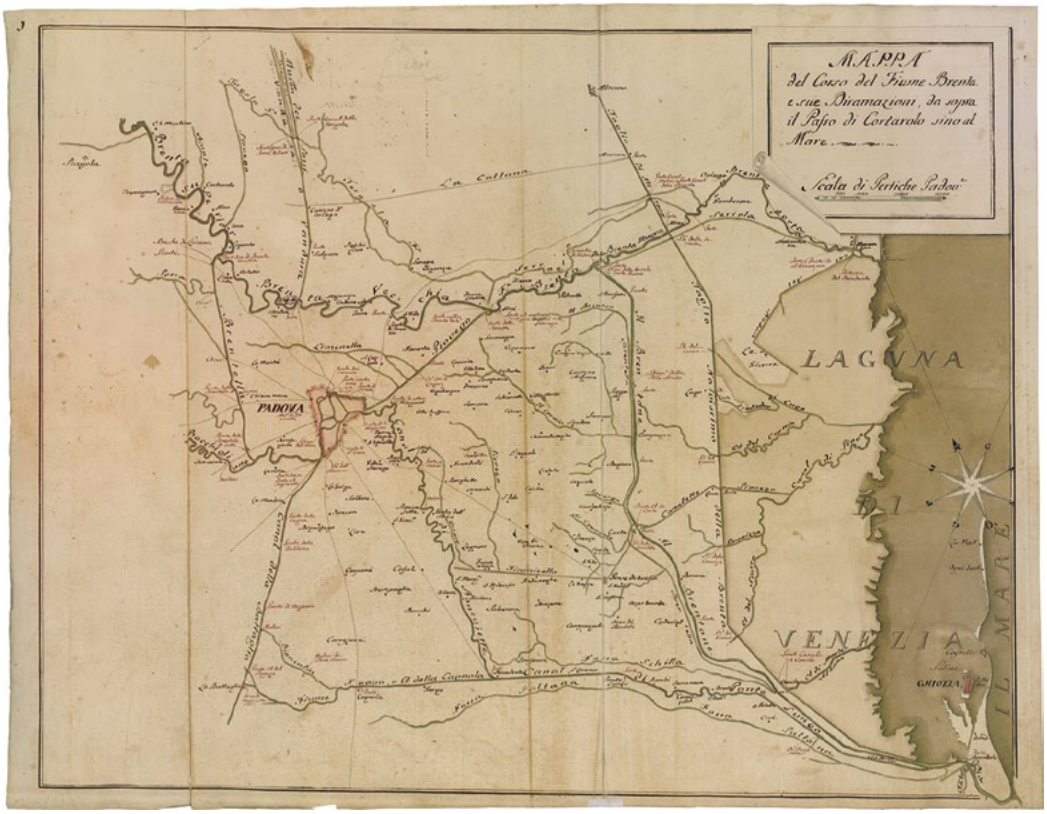

Fig. 19 - Anonymous, *Mappa del corso del fiume Brenta e sue diramazioni*, 1770 circa, coloured drawing [ASVe, Savi ed esecutori alle acque, Atti, b.9].

how, even in the Napoleonic period, Padua was assigned a central role in the planning, implementation and management of work on the water network in the Veneto-Adriatic area and, within the scope of this analysis, the city can be considered as having had the role of hub, to use a contemporary term (Fig. 19).
Its function as an interchange hub for water links between different cities and between the two sides of the northern part of the Italian peninsula is visible not only in the dynamics of the technical work carried out on the water, but also in the mechanisms of cultural and scientific exchange that took place between Italy and France in the early 19th century.

III.3.2 The French operational model for Padua

In the common dynamic of the *mise en place de l'eau*, the French engineers had "exported" the theoretical and practical know-how acquired in the design of the new Parisian canals, while "importing" traditional Veneto *savoir technique* in the field of hydraulic engineering into France.
The hoped-for use of the international water network for trade had enabled the Napoleonic engineers and governors to imagine connections extending over a very extensive area.
The study of the documents has made it possible to reconstruct clealty that the Veneto-Adriatic area was one of the main nuclei of interest: Venice, due to its historical role, and particularly Padua, due to its geographical position and complex water system, were undoubtedly the two focal points of this nucleus. The lagoon city and the Department *della Brenta* were two water basins of crucial importance: for their wealth and their outlets into the Adriatic on one hand, and for their connections – existing or planned – with other areas of the Empire on the other.
The project for the *Navigation Bonaparte* envisioned, among other things, travelling from Paris to the Adriatic via the rivers and canals of Eastern Europe: once in the so-called gulf of Venice, the boats could reach both the lagoon, and therefore Venice, and the mainland, sailing up the river Brenta and through Padua. By exploiting all the connections with the other towns and cities in Veneto and the royal and imperial departments, the project envisioned "uniting" all the territories of the Empire in a single, large, ramified waterway. The extreme interest of French engineers and governors in the water systems of Venice and Padua was therefore undeniable, but the attention paid to the two cities was not the same, nor did it envisage the same operations.
On one hand was Venice, fundamental in its celebratory, directional and representative role: in French hands, the city's functions, spaces and public facilities would be modernised[17]; the delicate water network on which it was conceived and developed, and

[17] Cf. the contributions edited by the author in 2013 and 2021.

which had always attracted the attention of the engineers and government of the Most Serene Republic of Venice, had to be monitored and maintained to preserve the balance that had enabled the city to survive and defend itself for centuries.

On the other hand, Padua was at the centre of a mechanism that could be described as more dynamic: even though it was necessary to defend the city from floods and the damage they might cause, the preservation of its role as a junction between the sea and the mainland, between the north and the south of Italy and between western and eastern Europe, remained one of the most important nodes in the French technical programme (Fig. 20).

The planning of operations to regulate the Brenta and Bacchiglione was useful both to protect the city and its territory from flooding and to allow continuous use of the canals within the urban structure; the aim was to avert the need to bury the canals, which would have altered the flow of navigation and reduced the permeability of the city.

A document dating back to the first decade of the nineteenth century contains further traces of the French operating model. Charles Fréderic Wiebeking – hydraulic engineer, councillor of state and Director General *des ponts et chaussées* – published his *Memoires* in 1810: the author of the document proposed showing the King of Bavaria, in whose service he was employed, a series of works proposed to the government for the improvement of

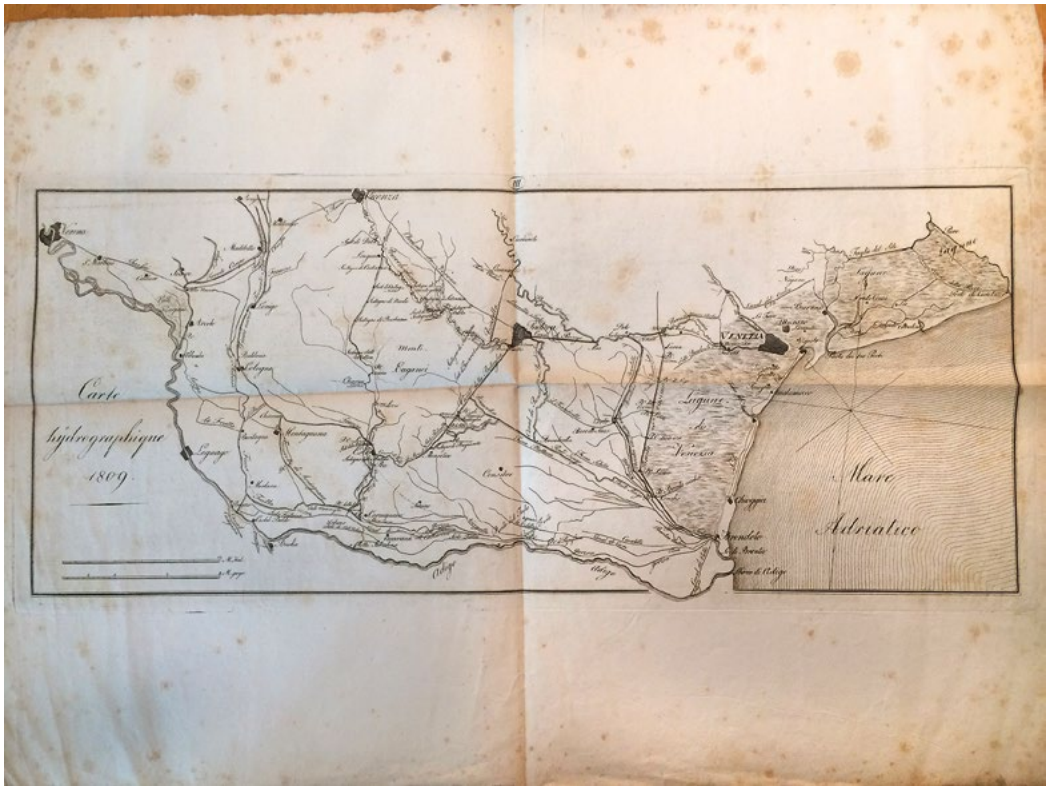

Fig. 20 - Anonymous, *Carte hydrographique*, 1809, print [BIB.E.P.C., Fonds Prony, Ms. 3110].

the ports of Venice, the islands of the Lido and Malamocco, for the *réamenagement* of the courses of the Brenta and Bacchiglione and the navigation channels between Venice, Padua, Verona and the Adige.
Wiebeking focuses on the canals of Este, Padua and the Brentella, and on the course of the Bacchiglione, criticising the projects planned by the Austrians during the First Domination: «*A cette époque de 1803 des ingénieurs ont conçu le projet de creuser un nouveau lit à la Brenta: ce travail, nous ne craignons pas de le dire, n'aurait d'autre effet, que d'empirer le mauvais état des fleuves, qui circulent dans les états vénitiens* [...]» [doc. n. 51 of the Documental Appendix].
The author clarifies the strategic importance of Padua's rivers and canals: the Brenta, to the north, was considered the most important river in the Padua area, both for its capacity and for being one of the main tributaries of the Lagoon; on the other side, the Bacchiglione was linked to the Brenta by a complex hydro-geological relationship, thanks to which it received part of its water. which it carried into the centre of Padua. For this reason, as Wiebeking himself points out, both courses required improvement: in this way it would have been possible to limit the damage caused by flooding, continuing to guarantee the use of the connecting canals inside and outside the city, which were still largely exploited «*pour emporter les matières et nettoyer le lit du fleuve*» [doc. n. 51 of the Documental Appendix].
In applying a tried and tested model of intervention, the French would seem to have considered the territory of the Department *della Brenta* and its capital, not only as a place of knowledge and experimentation, but also as the operational centre of intervention. By creating supervisory bodies based on the French model, proposing similar intervention tools and incorporating the area into a framework, that was not only national but also international, of exchanges with the eastern part of the territories, it seems that Napoleon's officials wanted to make Padua and its context, its geographical and political centrality, its close links with the sea on one hand and with the mainland on the other, one of the fundamental points of the Empire.

III.3.3 Giuseppe Jappelli and Pietro Paleocapa: "French" engineers at the service of Austria

Traces of the ideas and work of the French were to always remain clearly visible in and around Padua, even in the decades following the collapse of the Empire and the birth of the Lombard-Veneto Kingdom of the Habsburgs. Within the scope of the urban history of the Venetian area, the transition from Napoleonic to Habsburg rule often triggered a mechanism of continuity, rather than reversal, of the projects implemented by the French. The few years of domination in Italy had enabled French engineers to develop numerous plans and projects, but to implement only a few. Upon arriving in the territories, the Habsburgs opted for a substantial preservation of the supervisory bodies created by the

French – while dividing the administrative functions between Milan and Venice – and to actually implement projects that had already been planned[18].

In 1813-1814, just after the fall of the French Empire, the Austrians confirmed most of the Napoleonic regulations governing the management of water resources, and it was only after 1815 that some of the characteristics of the institutional framework changed. In July of that year, the Ispezione centrale per le province venete[19] was created, with two offices, one in Milan, for the Lombard provinces, and one in Venice, dedicated to the Venetian provinces.

The division between Venice and Milan effectively created two independent regions: the Milan region encompassed all the waterways that flowed into the Po from the Ticino to the Oglio, while that of Venice region included all the waterways that flowed into the Adriatic, from the Adige to the Isonzo [Zucconi 2008b, 159].

The Venice office was run by Angelo Artico, who had already been in charge of the Magistrato Centrale alle Acque in Venezia, created by the French, and author of the Brenta regulation plan approved by Bonaparte by decree of 27 June 1811 [doc. n. 56 of the Documental Appendix]; the office was organised into provincial sub-offices – those of Padua, Verona, Vicenza, Treviso, Belluno, Udine and Este – and had three sub-inspectors, one for rivers, one for bridges and roads, and one for the lidos and the lagoon: the same sectors in which the old Magistrato operated. The work of the Ispezione Centrale per le acque was not, however, under the control of the Ministry, but depended directly from the central power of the Hofbauamt in Vienna [Zucconi 2008b, 154-155].

In January 1824, the Ispettorato generale delle acque e strade was absorbed by the Direzione delle pubbliche costruzioni, with the addition of a «buildings» section. The Office extended its range of action, often clashing with the jurisdiction of other similar bodies: the municipal deputations (which were responsible for canals, buildings and non-royal roads), the landowners' consortia (which could carry out drainage operations and provide support for local operations) such as the Consorzio degli Orti di Vanzo [doc. n. 60 of the Documental Appendix] and the military commands which were responsible for access to ports and for some roads.

After the revolutionary uprisings of 1848, the Direzione centrale moved to the highly militarised city of Verona, reporting directly to the Ministry of Public Works: this limited the "interference" of local administrations, allowing the authority to deal also with the construction of the railway lines. The Venetian area of the Office only returned to the city permanently in 1859: Venice was an important centre, both from the point of view of hydraulics and because of its proximity to Padua and Simone Stratico's school of hydraulics.

[18] Cf. the contributions edited by the author in 2013.

[19] The Central Inspection Body for the Veneto provinces.

What was perhaps the biggest difference in the approach of the two governments was that, during the turbulent years of its rule, the Habsburg kingdom had failed to fulfil one of the biggest promises made during the Napoleonic period: the idea of a unitary command that would quickly and smoothly solve problems related to territorial and urban waters [Zucconi 2008b, 153-160].

Within the scope of the scientific, cultural and technical exchanges between Bonaparte's France and Italy and the changes made to the administrative system under Habsburg rule, two Italian technicians, one trained as an architect and the other as an engineer within the French ranks, continued to work under Austrian rule, creating a further link between the two governments. These technicans were Giuseppe Jappelli and Pietro Paleocapa.

Giuseppe Jappelli actively experienced the French training environment. Born in Venice in 1783, Jappelli studied mainly in the Enlightenment environment of the Accademia Clementina in Bologna, the city where his father Domenico had been born, and in the studio of the cartographer Giovanni Valle.

In 1803, his affiliation to Jacobin-style Masonic lodges brought him into close contact with French culture and its philosophical, political and social principles, and introduced him to highly cultured circles and personalities [Puppi 1982, IX].

Having graduated with honours as an *ingénieur*, from 1807 he worked passionately in the Corpo degli Ingegneri d'Acque e Strade of the French Department of Brenta and, in 1809, joined the Napoleonic army under viceroy Eugene. Discharged four years later with the rank of captain, Jappelli moved to Padua making it his second home.

Unlike Venice, Padua, as we know, had recently undergone major changes: the reinforcement of the city walls, the opening of numerous new chairs at the University, the installation in the city of the new French authorities for water surveillance and the development of projects for the water *réseau* on an urban and territorial scale. All this operational vitality had prompted government officials to train technicians capable of interpreting and updating the specific features of that identity typical of the intellectual elites [Puppi 1982, 15].

Jappelli became one of the greatest interpreters of the profession of civil architecture, understood in the French manner, and reinforced it with the typical characteristics of the figure of the engineer developed at the École Polytechnique de Paris: «*homme moderne par excellence*» [Puppi 1982, 19].

As an engineer, he was constantly involved in road works and the reorganisation of the city; the fact that he was a member of same confraternity of the French general Alexandre François de Miollis (1759-1828) in the Masonic lodge in Venice, together with his strong pro-Napoleonic personality, led him to obtain, in June 1809, a commission to stage the show linked to the presentation of Francesco Alberi's painting of Napoleon's triumph as the liberator of Italy, directed in the name of grandeur and celebration in perfect French style.

The collapse of the Empire in 1814, his obligation to leave the city and his two-year stay in Cremona did not, however, prevent him from increasing his personal fortune: his stay in Lombardy allowed him to visit Milan, study Giovanni Antonio Antolini's architecture and remain in contact with the cultural environment in which he had been schooled and which had always inspired him.

When he returned to Padua in 1815, despite the advent of the Restoration, he was entrusted with the organisation of another great celebration, that of the arrival of the Austrian emperor and empress Francis I and Maria Ludovica. For the occasion he designed an ephemeral backdrop that recreated a garden enriched with arches, columns and obelisks; the result was equal to the opulent triumphs of Napoleon and gave the architect the opportunity to return permanently to Veneto. There he was able to resume the urban redevelopment projects begun years before and abruptly interrupted after the defeat of the French troops.

Driven in part by Francesco I's desire to create works of public utility, between 1819 and 1830 Jappelli drew up a series of projects relating to urban waters and the public spaces connected with them, which formed the backbone of a great new design for the urban structure of Padua. It was a study that had grown out of the «*pratica quotidiana della cura delle strade, delle vie d'acqua, dei ponti*» [Puppi 1982, X] and that had gradually been articulated on the basis of the need for the new and efficient performance of the urban territory. The expansion of the modern city was reorganised, with a general zoning of the different macro-areas, as part of a process of what we today might call urban design [Bianchi 1981].

Jappelli planned to redevelop the chaotic southern part of the city, rebuilding the Loggia Amulea in Prato della Valle, transforming the latter into the new forum of Padua, and installing the new seat of the University between the Basilica del Santo and the Abbey of Santa Giustina. When the Venetian architect began to draw up these proposals, the Municipality had already long since acquired the Prà della Valle reservoir from the Benedictine monks of Santa Giustina. As we will see later, a few years after the acquisition, between 1775 and 1776, the superintendent Andrea Memmo then commissioned Domenico Cerato to equip the area as the arrival point of the routes from the historic centre. By partially burying the waters of the Alicorno canal and using them as the main component of the project, the public space was configured with a series of shops arranged around an island surrounded by a small artificial canal, bordered with statues, like a little amphitheatre in the centre of the square.

In this way, the Prato della Valle project would not only have had the merit of creating a new public space, but also of regulating the waters of the Alicorno, facilitating their outflow and the reclamation of part of the surrounding land. Jappelli's plans for the old college and the new university would therefore have represented the ideal completion of the 18th-century Prato project.

Jappelli's plans for the north-eastern part of the city, in the area between the Church of the Eremitani and what is now Via Loredan, included the Macelli Comunali[20], built between 1819 and 1821 [Puppi 1982, IX-X]: built close to the waters of the Piovego, the slaughterhouses would have exploited the course of the canal for the production of energy and the discharge of waste outside the city walls.

Jappelli also created a project that exploited the water in a more "landscapist" sense: in an area near the western city walls, behind the Basilica of Sant'Antonio, the architect designed the city's only English-style park, Parco Treves. The romantic garden was built by Jappelli between 1829 and 1835, as commissioned by the Treves dei Bonfili family, and named after his brothers Isacco and Giacomo, the latter being a famous collector, patron and lover of botanical science, like his brother[21].

The garden – which was structured like a real botanical garden, filled with exotic species – was located right on the exact spot where the Alicorno, partially buried under Prato della Valle, re-emerged: Jappelli exploited the presence of the canal to create the irrigation system and routes, working on the water in an architectural and landscaping sense. The architect also worked on the design of wells, water pumps and drains, always with a view to improving the city's canal network and always paying close attention to modern construction methods for water-related projects such as bridges, suspension bridges and hydraulic machines in general [Mazzi 2012, 16-17].

Jappelli stood out as one of the greatest interpreters of the Enlightenment instances of French culture: he managed to be both set designer for the emperors' celebrations and nineteenth-century planner of the re-purposing of the city's water, architecture and landscape.

Pietro Paleocapa is the other key point in the connection between the work of the Napoleonic era and that of the Habsburg era. Although almost all of his professional activity was performed in the service of the Austrians, Paleocapa was often critical of the work of the Hapsburgs, first praising «*il buon governo idraulico in età veneta*» [Zucconi 2008b, 160] and then that of the period of Napoleonic domination, under which he had trained.

Paleocapa was born near Bergamo in 1788 to a family – as his surname suggests – of Greek origin; he studied law and mathematics at the University of Padua before moving to the reformed School of Artillery in Modena in 1808, graduating as Engineer in the Italian Royal Engineering Corps in 1812. In this capacity, he worked on the redevelopment of the fortifications at Osoppo and Peschiera del Garda, while serving in Napoleon's

[20] Municipal slaughterhouses

[21] On the history of the Treves dei Bonfili family and in particular on the figure of the collector Giacomo, see, among others, the valuable contributions of Martina Massaro edited in 2013 and 2014. On the history of the Parco Treves dei Bonfili see the contributions edited by the same author in 2014 and 2019.

army. To avoid serving under a different flag, in 1817 he applied for and was granted entry into the Austrian civil administration, quickly rising to the most senior positions: starting out as ingegnere supplente, in 1830 he became chief engineer at the Direzione generale delle Pubbliche Costruzioni in Venice [Tiepolo 1990, 11]; in 1833 he joined the Direzione Centrale as «officer of rivers» and, in 1840, finally became Director of the Administration of Pubbliche Costruzioni, an office which he held until 1848 [Zucconi 2008b, 161], when, in the wake of revolutionary uprisings, he left Veneto and moved to Turin, where he died in 1869.

Having trained in the French technical and military environment, Paleocapa always remained faithful to his old and early ideals: he considered himself a purely "Napoleonic" official, conceiving the imperial period as an «*incubatore progettuale*» [Zucconi 2008b, 162], the work of which was only really realised from 1866, with the creation of the unitary state. Paleocapa was an outstanding driving force: his activity was based on continuous research and in-depth study with a view to designing a new hydrographic system for the Veneto region, based partly on the old regulations of the Most Serene Republic of Venice and on those developed by the French government [Zucconi 2008b, 163][22].

In addition to a project for the construction of an iron suspension bridge – which was never actually built – over the Adige at Boara in 1825, and in spite an ill-concealed aversion to the decisions made by Austrian, between 1830 and 1840 Paleocapa appeared as an advocate and promoter of a series of proposals by the Hapsburg government for major hydraulic and territorial reorganisation projects. The engineer had devoted much of his professional activity to projects to regulate the rivers in Veneto, particularly the study of the outflow of its rivers into the sea, the reorganisation of the coastline, and the maintenance of the Adige and the Veronese Valleys, closing off the Castagnaro tributary and performing the relative reclamation works [Zucconi 2008b, 166-168].

Between 1838 and 1846, almost at the end of his activity, Paleocapa presented a solution for the reorganisation of the inlets and access canals to Venice, using a series of plans from the Napoleonic era and, envisaging, among other things, work on the Malamocco dam [Tiepolo 1990, 13].

The biggest problem for the water network in Veneto was the matter of re-introducing the Brenta into the Lagoon. A veritable debate rose up around the issue, involving technicians, residents and local governments: on one hand, the Venetians opposed the re-introduction works due to their fears that the Lagoon would be gradually buried; on the other, the residents of the mainland, particularly the people of Padua, were urging it on, due to the fact that they were continually threatened by high water levels and

[22] For a clear overview of Pietro Paleocapa's work, see the contributions of various authors (AA.VV.) edited in 1989. For a clear picture of his relations with the Habsburg government and other contemporary technicians, see the contribution edited by Maria Cessi Drudi in 1952.

repeated bursting of the riverbanks, such as in 1816, 1823, 1825 and 1827 [Zucconi 2008b, 164].

As we know, Angelo Artico had already drawn up a plan in 1787 and this was later revived by the Napoleonic officials. It envisaged the adjustment the Brenta, but not its re-entry into the Lagoon. The situation of the river was still unchanged in 1821, and the floods continued. In a specific decree, the Viennese government ordered that the river be made to flow into the Lagoon, but the decision was ignored. In 1829, the Hapsburg government decided to consult another acclaimed hydraulic engineer, Vittorio Fossombroni (1754-1844). Born in Arezzo, educated in law at the University of Pisa and with a strong passion for hydraulics and mathematics, was a skilled and knowledgeable technician who was already well known in Napoleonic times: Bonaparte asked the Grand Duke of Tuscany, in whose service Fossombroni was employed, to appoint him Minister of Foreign Affairs at the end of the 18th century. Fossombroni also had a good relationship with the Bourbon regents of the new Kingdom of Etruria (1801-1807) and, further tightening relations with Bonaparte, in 1805 he joined the Tuscan troops in the service of the Empire as a general and was appointed a member of the Imperial Privy Council in 1809, receiving the title of Count of the Empire.

In 1834, Paleocapa was authorised by the Austrian government to go on a mission to Florence to work with Fossombroni [Tiepolo 1990, 34], studying a method for solving the problem of flooding in Padua without damaging the Lagoon. The two technicians produced studies, drawings and surveys during 1835, but the flood of 15 December 1839 caused the government to finally bring the delays to an end and issue a decree ordering the immediate re-introduction of the river into the Lagoon. Fossombroni expressed his opinion on the matter at the beginning of 1840. The engineer recommended that only part of the water should be returned to the lagoon and that it should flow into the southernmost area, where the new outlet of the Brenta was, in effect, subsequently located [Zucconi 2008b, 165-166]. From 1841, Paleocapa was able to draw up a new order for regulating the water in the Lagoon and create his most important project, the Piano Fossombroni-Paleocapa.

The project envisaged the ex-novo construction of another external water drainage canal, currently known as the Canale Scaricatore, which was completed in 1863. Starting from Bassanello, the structure, which runs south of the city centre, would have collected all the water in the Padua area – that of the Brenta, Bacchiglione, Piovego and Roncajette. Leading them south-eastwards, to the outlet in Chioggia, the new canal would restore a more natural and fluid circuit to the water system, bypassing the city. In 1874, the canal was also equipped with the construction of three locks, one at the beginning of the canal, one at the confluence with the Bassanello, and one at the confluence with the Battaglia canal [Tiepolo 1990, 12, Adami 1989a, 50].

Also in Veneto, Paleocapa personally supervised the project for the construction of the Milan-Venice section of the Ferdinandea railway in 1846. The engineer saw the construction of the railway link as representing one of the first modern forms of intermodal transport, interchanging with the ports.

Paleocapa, like Jappelli, maintained a strong relationship with the innovations introduced by the Napoleonic system. In 1839, the engineer was one of the members of the Veneto Institute of Science, Letters and Arts. The Institute had been founded in 1838, together with the Lombardo Institute of Science, Letters and Arts, based on the model of the Napoleonic National Institute, founded in 1802, which became the Institute of Science, Letters and Arts in 1810, with its headquarters in Milan and various sections, including those of Venice and Padua. It is also documented that, in 1835, Paleocapa was also a member, in the Science class, of the Veneto University, founded in 1812, again by Napoleonic decree [Tiepolo 1990, 47-50].

The architect Jappelli and the engineer Paleocapa formed the bridge between the technical work of the Napoleonic government and that of the Habsburg domination. The traces of the plans and actions of the French remained clearly visible even after the transition to Austrian rule. In a context of cultural and scientific continuity, which contrasted with that of political discontinuity, the two technicians were among the leading interpreters of the French operational model under Austrian rule.

IV
Padua: an antique tradition of water (1720-1790)

IV.1 The late 18th century water network

IV.1.1. Transport, procurement and areas of operation

Carried out between the 13th and 14th centuries – in that troubled period during which the city, in order to defend itself from the political ambitions of the Della Scala family, lords of Verona, witnessed the rise of the Da Carrara seigniory (1318) – the first interventions on the city's waters, managed by a special magistracy, known as the Magistratura degli Ingrossatori[1], were instrumental in setting up the system of the Tronco Maestro, the Naviglio Interno and part of the canalisations. From the 16th century onwards, having come under the direct rule of the Most Serene Republic of Venice, the city continued to expand and the urban water resources experienced a substantial increase in their degree of exploitation, with the establishment of artisan workshops, shops and mills. Expanded and enriched with new functions, Padua became one of the most important water cities in the Veneto region, thanks also to the presence of three river ports and a large number of inlets with the most curious names: *pozzo dipinto*, *pozzo del campione*, *pozzo mendoso* [Bortolami 1989b, 32-34]. The connection between the centre and the outskirts was also guaranteed by the presence of the city walls: thanks to the fact that they were practicable, the walls could connect various points in the city through a complex system of bridges, towers and gates (Fig. 10).

All the secondary canalisations and intakes that had been created over the centuries had, however, promoted an imbalance in the relationship between inland waters, causing navigation to suffer in terms of efficiency and speed. A series of supports, also known as *vampadure*, were therefore created. By regulating the water level of the canals, they were able to facilitate navigation and other uses. In this sense, the most important work was the construction, in the 16th century, of the aforementioned basin for the navigation of the Porte Contarine [docs. n. 2 and 4 of the Documental Appendix]: the creation of the new structure made it possible to remove the old supports.

Cristoforo Sorte's map of the city (1510-1595), dated 1550, illustrates quite clearly the hydraulic structure of Padua in the first half of the 16th century. By the mid-sixteenth century, the new walls had extended the boundaries of the *urbs* to include an area with numerous canals. It is reasonable to assume that these were dug under a series of licences granted by the city to private individuals and religious congregations [Bortolami 1989a, 47]. The purpose of Sorte's drawing was probably to document the greater or lesser need for various types of intervention: the drawing shows the construction of

[1] The purpose of the Magistratura degli Ingrossatori was to control and manage water matters. One of the various tasks of the Magistracy was to «*far aprire e sgomberare gli acquidotti, i canali e i letti dell'acque pei quali erano solite di scorrere, secondoché fosse meglio lor parute*», but its operation was often hindered by the complaints of private individuals. See in Bibliography of sources Gennari 1776, p. 90.

a number of buildings in specific areas, such as Prato della Valle, Santa Croce, Porta Saracinesca and Porta San Giovanni [Bevilacqua 1987, 49][2].

Every single diversion in the Paduan water network was important for the stability of the system, but some interventions were undoubtedly considered more important than others. In addition to the area of Porte Contarine, Ponte Molino and Portello, the area to the south and south-east of the city was the focus of the Venetian government's attention. Crossed by numerous diversions which ploughed through low and marshy land, the area often presented navigation problems, mainly due to the flooding of the canals and surrounding land, such as the Prato della Valle area and the Vanzo gardens.

Probably for this reason, on 27 September 1767 the owners of some millstones located to the south-east of the town asked for urgent work to be carried out to consolidate the banks of the Santa Chiara canal. Starting from the Porta delle Torricelle gate, the canal connected the Naviglio Interno to the San Massimo Canal, which, as we know, conveyed urban waters to the Roncajette Canal, which acted as a drain.

The constant falling of rocks into the canal, caused by flooding, prevented the smooth running of the diversion «*della quale conosciuta molto importante la conservazione*» [doc. n.10 of the Documental Appendix], limiting the supply of energy to the mills and preventing the smooth navigation of the canal.

A few years earlier, in 1766, the Savi Giulio Contarini, Marco Calbo, Andrea Querini, Giacomo Corner, Benedetto Grimani and Girolamo Ascanio Molin, had published another decree, which referred to a provision approved by the Venetian Senate over sixty years earlier [doc. n.7 of the Documental Appendix].

The text refers to some works carried out at the end of the seventeenth century by the Proto Alvise Giacon, and authorised by the then Deputy Podestà and *capitanio* of Padua Giovanni Donà: these works were aimed mainly at raising some of the city's embankments, in the area north of Ponte Molino and especially south of Porta delle Torricelle and Canale delle Roncajette.

On 22 March 1766, the Savi ordered that nothing be done to alter the layout established after the work of 1693 and, above all, that no walls should be erected along the course of the Canale delle Roncajette, as had been attempted: «*essendo comandato che sussista e nessuno ardisca porvi mano ed alterarla, tanto meno di alzarvi mai nessuna opera di Muro, come pareva a volersi arditamente tentare nel Canal di Roncajette*» [doc. n. 7 of the Documental Appendix].

Then, in 1782, the inhabitants of the Vanzo district asked the Podestà to carry out urgent excavation of the small diversion that branched off from Porta Saracinensca and which flowed eastwards, linking up with the Canale delle Torricelle: «*Fiumicello, che dalla Porta*

[2] On Cristoforo Sorte's work as a geographer and cartographer, see the essential monographic contribution by Silvino Salgaro published in 2012.

Saracinesca entra nella città di Padova, e scorrendo per la Contrada del Vanzo si unisce e scarica nel Canale inferiore delle Torreselle» [doc. n. 14 of the Documental Appendix].
In addition to the internal canals, the rivers, as we know, were also one of the key points in the province's water structure. The stability of the city's canals, their navigability and the production of energy depended on their course and their greater or lesser flow.
It was from the second half of the 18th century that a series of projects for the improvement of the main rivers were drawn up. At that time, hydraulic engineering was based on solid scientific knowledge, obtained through the study of numerous treatises that had been published over the years. These included Benedetto Castelli's (1578-1643) treatise on theoretical hydraulics from the second half of the 17th century and Domenico Guglielmini's treatise on river hydraulics (1655-1710) [Bevilacqua 1987, 52].
Commissioned by Giovanni Poleni (1683-1761) and compiled in 1739, the map by cartographer Antonio Tintori was still a real working document on which to base a restoration programme to present to Venetian administrators. The design of the walls, which was very clear on Cristoforo Sorte's map, is barely sketched in Tintori's map. On the other hand, the layout of the water supply network is very detailed, both for the main and secondary channels, with their subsequent connections.
Dating from a few years before Tintori's map, Bartolomeo Franceschini's 1724 *Carta del territorio Padovano* identifies, among the various elements that make up the drawing, the city centre with the radial expansion of the streets and the outline of the floods caused by the Brenta, the Brentella Canal and the Bacchiglione, skilfully highlighting the streets most frequently subject to flooding. Franceschini's project, however, did not seem to be very far-reaching: it essentially involved reinforcing the existing embankments and restoring an ancient hydraulic structure, the Colmellone di Limena, destroyed by a flood in 1633 [Bevilacqua 1987, 52].
In the intervals between 1752-1756 and 1761-1765 the Brenta underwent numerous cutting and regulation works[3] and both rivers underwent a levelling of the waters in various points, in 1786 and 1787 respectively, which had become indispensable in an attempt to keep floods under control[4].
Thanks to the study of the maps, it is possible to note the particular prudence of the Venetian Magistracy for Water with regard to alterations to the mainland water networks: any work to be carried out, in fact, would have generated not only changes to the Padua water network, but also repercussions on the Lagoon, where it was essential to maintain the proper balance between fresh water, salt water and turbid water. Precisely for this reason, as we know, in the centuries preceding the 18th, the Magistracy had carried out all the works to move the river mouths away from the Lagoon, lengthening

[3] ASVe, Savj ed esecutori alle acque, b. 976
[4] ASVe, Savi ed esecutori alle acque, bb. 994,995.

the course of the river on the mainland, causing a decrease in the slope and an increase in the frequency of high-water levels, bursting of the riverbanks and flooding.
By the middle of the eighteenth century, thanks to the studies of technicians, surveys and the requests of private citizens, the Magistracies and *Proti* had already clearly identified the most problematic areas of the system. By drawing up maps and drawings, the engineers had already developed a series of measures to at least partially rectify the water imbalances caused by the relationship between the major rivers and their channels.

IV.1.2. Porte Contarine, the Mulini area and the Portello district

In this complex water system, everything that happened at territorial level, in terms of floods, water flows and maintenance works on the major rivers, was irremediably reflected in the canals within the walls.
Because of its complex morphology, the network of city waterways in the mid-to-late 18th century required technicians and governors to carry out important monitoring, conservation and enhancement work, like that planned for the two great rivers, the lagoon, the lidos and the ports.
There were two more delicate areas (apart from the area south of the centre) within the urban structure that required work and on which operations continued in the 18th century: the area around the Porte Contarine and the mills of Ponte Molino, to the north, and the Portello area to the east.
In an undated letter of 1523, the then *capitanio* of Padua, Francesco Donado, informs Doge Andrea Gritti that he has appointed Giacomo Dondi dall'Orologio[5] as *ingegnero* for the construction of the Contarine lock and its *portoni*: «*Ingegnero nominato Giacomo da Relogio in far la commoda Navigazione di detti Barcaroli, et altre barche, et burchi, che potranno passare in Torreselle, e alle Contarine senza lo esser più bocca alcuna*» [doc. n. 2 of the Documental Appendix].
The *Informazione riguardante il Canal di navigazione di Padova dal Ponte di Legno sino alle Porte Contarine* specifies how, following sixty years of complaints by the committees of *barcaroli* regarding the difficulties surrounding the navigation of the canal used to transport goods to Venice, the decision was made in 1523 to build the Contarine basin. The lock, with a double door on the inside and a single door on the outside, had a dual function: on one hand, it would allow boats – *burchi* and *burchielli* for the transport of

[5] The technician Giacomo da Relogio should not be confused with his two almost homonymous ancestors, the physician, astronomer and watchmaker Iacopo Dondi dall'Orologio (1293-1359) and the philosopher, poet and watchmaker Giovanni Dondi dall'Orologio (1330-1388). The addition of *dall'Orologio* to the surname of the Dondi family stemmed from the project, developed by Iacopo in the fourteenth century, for a mechanical clock. According to sources, this would be the clock that still exists in Padua, installed in the Capitaniato tower (the ancient tower of the Reggia Carrarese) in Piazza dei Signori, which was completed in 1434 to the design of another member of the family, Novello dall'Orologio.

people, and *peote*[6], barges and rafts for the transport of goods – to overcome the difference in height between the outer waters of the Piovego and the inner waters of the Naviglio; on the other, the *Portoni*, which could be crossed in exchange for the payment of a toll, would allow the maintenance of a good level of navigation of the Naviglio Interno, facilitating the passage of the boats: «*che col aprirle, e chiuderle alternativamente si dà tragitto alla Navigazione, e nel tempo istesso si tien ferma e incassata l'Acqua del fiume per facilitare, e render continuo, e libero il corso delle Barche senza più verun incomodo*» [doc. n. 4 of the Documental Appendix].

The "external-internal" passage to the north of the city, which included the Carmini, Porte Contarine and Porciglia lock systems, was one of the most delicate points in Padua's urban canal system.

Not far from the Porte Contarine, there was an area full of mills, adjacent to the so-called Ponte Molino. As we know, there were a lot of mills, twenty-six according to a census carried out in 1811 [doc. n. 54 of the Documental Appendix], and probably many more in the middle of the eighteenth century, when water-based manufacturing activities still formed the backbone of the urban economy.

While on one hand, the presence of the mills helped to keep the city's trade and finances flourishing, on the other, by partly diverting the water, it created water shortages in the Naviglio Interno, further weakening an area that was already very delicate.

Not far from the Porte Contarine and the mill area there was another area considered fragile by the magistracy. Located on the outskirts of the city, but still within the walls, the Portello area was found next to the calm waters of the Piovego. The Portello gate, which still stands today at the junction between Via del Portello, Via Loredan and Lungargine del Piovego, was the entrance to the inner port area of the city, where boats could stop and manoeuvre the goods traded in the city's import-export activities. It is likely that, around the 16th century, the port on the Piovego replaced the Portello Vecchio landing point, probably once located at the confluence of the San Massimo and Roncajette canals[7], which guaranteed the connection with Venice in pre-Renaissance times (not to mention the ancient Roman port of call in the lagoon, probably located on the ancient Metamauco, now Malamocco).

It was in 1753, in a letter with an unfortunately incomplete date, that the *Proto* of Padua, Giacomo Savio, wrote to the Podestà and the *Capitanio* of the city, reporting some water problems in the Portello nuovo area, which had endangered the buildings that housed the customs and couriers, as well as the public street and some private buildings: «*disordini*

[6] *Burchi*, *burchielli* and *peote* were typical Venetian vessels, used to cross the lagoon and sail up and down the Brenta.

[7] On this subject see, among others the contribution edited by Vittorio Dal Piaz, Giuliana Mazzi and Adriano Verdi in 2002.

occorsi al Portello che misero in pericolo le publiche fabriche per uso della Dogana e de' Corrieri, la publica strada e diverse fabriche particolari» [doc. n. 6 of the Documental Appendix].
Following an inspection which he himself carried out, the *Proto* indicates «*i rimedj opportuni*» to be carried out to rectify the situation: small elevations, some demolitions and, above all, consolidations aimed at increasing the resistance of the banks reserved for the two areas «*del Porto col Ponte, del Porto vecchio and del Porto nuovo*» [doc. n. 6 of the Documental Appendix].
The documents show that, in the mid-18th century, the main river network and the city's canals were still widely used for urban transport, energy production and procurement: testimonies from the period provide a clearer understanding of how, and with what tools, the Most Serene Republic of Venice devised the operations to be carried out on certain key points in the city. In order to preserve the functionality of the manufacturing facilities, safeguard private buildings and maintain the efficiency of the navigation network, the Republic's technicians, be they *Proti* or mathematicians, acted with skill, expertise and precision, demonstrating that they possessed the scientific tools that only an ancient tradition of hydraulic engineering could provide.

IV.1.3. *Operazioni a sollievo del fiume*[8]

In this context, it should be made clear that, in addition to a number of key points such as the Porte Contarine, the neighbouring area of the mills, the Portello area and the Vanzo district, some of Padua's internal canals were also a source of concern to the administration and required the attention of the technicians. It was mainly the canals that carried water of the major rivers internally and which consequently formed the fundamental framework of the whole complex system of derivations: the Tronco Maestro, the Naviglio Interno and the major derivation of the Alicorno.
As we know, the Tronco Maestro, which the mathematician Giuseppe Rossi called the «*Canale di Padova*» in his report [doc. n. 8 of the Documental Appendix], collected the waters of the Bacchiglione, which ran northwards from the Alicorno bastion to the fork of the Porta Saracinesca, and introduced them into the city. The Naviglio Interno, on the other hand, joined the Tronco Maestro passing through the mill area and was enriched not only by the waters of the Bacchiglione but also by those of the Piovego which, entered the city through the lock of the Porte Contarine from the outer walls, and flowed south to the Porta delle Torricelle. Lastly, the Alicorno canal received the waters of the Bacchiglione as it left the Bassanello, before it reached the Porta Saracinesca and entered the Tronco Maestro: the waters ran along the walls from the Alicorno tower to the Porta Santa Croce, which introduced them into the city in an easterly direction, as far as the connection with the San Massimo canal. In this complex of major canals, it

[8] Cf. doc. n. 9 of the Documental Appendix.

was obviously extremely important for the two components of the system, the Tronco Maestro and the Naviglio Interno, to enjoy a good inflow and outflow system and, above all, a good level of navigability.
At the end of the 15th century, the Doge Agostino Barbarigo asked the Podestà and the *Capitanio* of Padua to carry out works on the Naviglio Interno in order to improve navigation by the *burchi* and *burchielli* that transported goods to Venice [doc. n. 1 of the Documental Appendix].
Around the 1720s, the situation of the Naviglio Interno was still very complex, mainly due to the presence of turbid waters carried by the Brenta from the north and the Bacchiglione from the south, via the Tronco Maestro.
In 1719, in a letter dated 4 January, Lorenzo Mazi, public surveyor of the city, wrote to the then Doge Giovanni II Corner that it had become necessary to excavate the Naviglio Interno, which was excessively clogged with debris:

> *l'unico e necessizoso rimedio sarebbe stata l'escavazione del Canal, il letto del quale da molti e molti anni si hora presente si è imbonito per le acque torbide che passano per detto Canale, che vengon dal fiume Brenta, et Bachiglione* [doc. n. 3 of the Documental Appendix].

The following year, the aforementioned *Informazione riguardante il Canal di navigazione di Padova dal Ponte di Legno sino alle Porte Contarine* explained once again that, over the centuries, the Naviglio had been filled up with various kinds of debris, «*rovinazzi, tereni, cenere, scovazze*», due to both natural and man-made causes. The damage caused to the activities of *barcaroli* and merchants by the lack of navigability led the Collegio dei Savj to consider it essential to excavate the canal, an excavation which

> *si vede fatta nelli due altri Rami, uno, che si stacca alle Bovette del Bastion Alicorno, e scorrendo per la città, passa per il Pra della Valle e termina agli Edifici del Magio e del Ponte Corbo, l'altro alle Porte di Accademia, dette dell'Olmo, scorre per la città dietro agli Orzesini di Vanzo e termina agli Edifizi al Prato della Valle* [doc. n. 4 of the Documental Appendix] referring to the excavation of the Alicorno and Olmo canals.

In the middle of 1775, however, the excavation had still not been carried out, despite the requests sent to the Doge by numerous groups of boatmen and experts: on 8 May 1775, a letter was sent to the Podestà by the committee of the *Barcaioli* of Padua, Este, Montagnana and Vicenza – all cities that had close links with Padua in the organisation of the water network of rivers and canalisations – requesting, once again, the excavation of the Naviglio, «*del canale unico navigabile dal Ponte di Legno sino alle Porte Contarine*» [doc. n. 11 of the Documental Appendix]. It is likely that the problems with this excavation, which was in such high demand but never actually implemented, were mainly due to the timing of the calculations for the digging and the search for places to deposit the resulting sludge.
Just a few months later, on 1 August 1775, Alessandro Duodo, magistrate of the Collegio dei Savj ed esecutori alle acque, wrote to the provost of Padua, Andrea Memmo, requesting that the excavation of the canal «*esteso dal Ponte di Legno sino alle Porte Contarine*» –

the Naviglio Interno – be undertaken, taking into consideration the need to clean up the old canal at Este «*da cui al caso non si potrebbe prescindere, se s'intendesse di architattar cosa utile ne' grand'oggetti della navigazione*» [doc. n. 12 of the Documental Appendix]. Padua's government already had a very clear idea of the hydraulic links, and water balances between the canals inside and outside the city, and was planning works that would not only take into account the navigability of the urban structure, but also that outside, towards other cities in the province, with the intention of «*architattar cosa utile*».

As we have seen, the usability of the Este canal, together with that of the Naviglio Interno, was one of the key issues for the technicians of Napoleon's administration. Probably on the basis of the studies carried out while still under the dominion of the Most Serene Republic of Venice – and on the exchanges of correspondence and planning between the superintendents, the *podestà*, the public mathematicians, the doges, the citizens and the magistracies – the French technicians established the navigability of the canals as the primary principle for the correct exploitation of the urban and territorial water network of Padua.

In addition to the Tronco Maestro and the Naviglio Interno, the Alicorno canal was also one of the focal points of the activities of the Venetian Republic's hydraulic engineers.

In May 1767 the Paduan engineers presented a plan to the Collegio dei Savj ed esecutori to move the waters of the diversion completely outside of the city. By making them run along the moats of the south wall, the Alicorno would re-join the waters of the San Massimo canal only after passing Ponte Corvo towards the Roncajette canal drain. This plan was never implemented, however.

The plan illustrates the «*operazioni che si rendono necessarie a condur l'acque della Bovetta Alicorno nel Canal di S. Massimo dietro alle mura di Padova a sollievo del fiume che viene dal Bassanello ed inonda la Città*» [doc. n. 9 of the Documental Appendix].

In order to carry out this work «*a sollievo del fiume*» the engineers said that a lock with gates – like the one at the Contarine – would have to be built to regulate the flow of water during floods and that it would have to be coordinated with the construction of a new canal outside the town.

The eighteenth-century maintenance of the great rivers, the preservation of the efficiency of the major canals, the identification of crucial points in the city in which to undertake timely and decisive interventions: all these activities were part of a local framework of considerable operational vitality, based on ancient experience in the field of hydraulic engineering and high-level scientific knowledge, which the French almost certainly took into account when developing their water projects.

With their knowledge and experience, the technicians of the Venetian Republic dealt not only with punctual interventions and excavations, but succeeded, especially towards the end of the 18th century, in drawing up great plans, both on an urban and territorial scale: besides providing a clear picture of the late 18th century operations on the water network, these projects help to better understand the strong link between the Padua of the *ancien régime* and the Padua under Napoleonic rule.

IV.2 The matter of flooding and major projects

IV.2.1. 1775: the new Prato della Valle

Fundamental to the navigation circuit and to ensure the proper supply of water to the city, the southern part of the urban structure consisted of numerous ancient canals, the most important of which were the Alicorno canal – which branched off from the bastion of the same name and flowed eastwards – the Olmo canal and the Santa Sofia canal. They all flowed into the San Massimo canal and were derived directly from the Bacchiglione. The presence of the derivations, in combination with the low level of the surrounding land, had always created various water imbalances, such as frequent flooding, with consequent difficulties in navigating the canals and damage to crops.

During the Napoleonic era, the area was the focus of a number of projects to improve water management and deal with flooding emergencies, including the reclamation of the Vanzo gardens.

Almost fifty years earlier, the Venetian Republic had already regulated the course of the Alicorno, diverting part of it outside the city walls in 1767 and reintroducing it into the city only at Ponte Corvo.

1767 was an important year for the southern part of the city for another reason too: in August of the same year, the government decreed the transfer from private to public ownership of a large area close to the course of the Alicorno canal, the area known as Prato della Valle. The Prato area, which was probably a small depression, was frequently subject to waterlogging, which prevented the use of the area.

Following the diversion of part of the Alicorno outside the walls, the Venetian government had to radically reorganise this area as well. The hydraulic regulation and architectural reorganisation project led, as we know, to one of the most important and revolutionary urban regeneration works of the late 18th century in Padua: an 18th century reformer who borrowed much from French Enlightenment culture, the undisputed protagonist of most of the intellectual circles of the Most Serene Venetian Republic.

Historically, Prato della Valle was also called Campo Marzio: the name Marzio or *Marzo* was due to the fact that military events were held in the area or, more likely, to the marshy nature of the ground, referred to in Italian as *marcio*. The name Prato della Valle was assigned to the area later, probably in the Middle Ages, to indicate that seasonal markets were held in the marshy "valley" (hence the name Valle del Mercato, Market's Valley): October was characterised by the fair of Santa Giustina (which generated another place name, Prato di Santa Giustina), while the traditional fair of Sant'Antonio was held in June. As has been the tradition since the Middle Ages, these fairs took place in the liveliest and most confusing of situations, in which traders, petty thieves, actors, singers and performers of all kinds moved in a dynamic social mix [Zucconi 2012, 19].

When the Prato area became public property in 1767, the Podestà of Padua appointed four superintendents called Presidenti di Prato – modelled on the magistracy of the Presidenti delle Strade – and the city surveyor Francesco Bacin was immediately commissioned to carry out a planimetric survey of the area, to plan the works to be carried out.
A few years later, in 1775, the Venetian Republic appointed a new Rector for the city of Padua, who was to be responsible for the reorganisation of Prato. The Doge chose Andrea Memmo who, despite being in office for only one year, developed a great and revolutionary project.
The son of an illustrious Venetian family, into which he was born in 1729, Memmo immediately embarked on a glittering career within the administration of the Republic: in 1763 he was appointed head of Ceremonial of the five Savj alla Terraferma; in 1769 he was elected Savio del Gran Consiglio and, in 1771, he was appointed Provveditore alla giustizia Vecchia. Opposed to the "lobbying" powers of the guilds, a lover of the theatre and a friend of Carlo Goldoni, Memmo frequented the cultural circles of the British consul Joseph Smith in his youth, and it was at Palazzo Mangilli-Valmarana that he met Goldoni and the architect and engraver Antonio Visentini. In the consul's library, Memmo was able to read the works of Voltaire, Beccaria and Montesquieu – and his friend Giacomo Casanova introduced him to Parisian writers.
In the 1750s, Memmo cultivated another fruitful friendship, that with Carlo Lodoli. The Venetian scholar introduced the young Andrea to the theory of architecture, enriching it with the contributions of Enlightenment culture, recognising Palladio's work as one of the highest expressions of sixteenth-century architecture.
After supervising the publication *Elementi di architettura lodoliana* and after the "Padua period", Memmo lived in Rome on several occasions, first as an honorary academic at the Accademia di San Luca and then as the Venetian Republic's ambassador to the Papal States: in the intellectual crossroads that was eighteenth-century Rome, Memmo came into contact with leading figures of the time, such as Antonio Canova, Francesco Piranesi and Giannantonio Selva [Zucconi 2012, 32-37].
After serving as Venetian ambassador to Istanbul between 1778 and 1782, Memmo was appointed Procuratore di San Marco in 1785 and the following year he settled permanently in Venice, where he died on 24 February 1793.
When Memmo was appointed Rector of the City of Padua in 1775, the situation of Prato, the Alicorno canal and the surrounding areas was already unmanageable, and it had become increasingly difficult for the Venetian Republic to postpone organic and radical works aimed at regulating the water supply in the area.
Despite receiving authorisation to proceed and being in possession of the survey of the area, Memmo immediately faced financial problems.
The public coffers of Padua, which should have financed the project, were going through a period of great crisis. Unlike Venice, they were incapable of collecting revenue from

temporary taxes, which would have made it possible to generate fairly stable cash flows. Moreover, the city was unable to rely on the presence of a land register, which was essential for calibrating the taxation of property and land. In order to realise his ambitious project, Rector Memmo opted for a form of self-financing – equivalent to today's project financing – based on the resources of the individual contributors. The initiative was quite successful and, in the end, more than eight hundred people contributed to the so-called Cassa Prato [Zucconi 2012, 26-28].

Memmo's project had basically three main aims: to restore "dignity" to the now shapeless area of Prato, transforming it into an architecturally defined space; to create a space that would be suitable for the fairs that were held there and for managing the arrival of valuable goods and voluminous commodities; and to design a place dedicated to mass entertainment, such as the palio, regattas, chariot races and night-time firework shows.

For this reason, Memmo had developed a new design for the area, which was drawn up by the expert hands of Domenico Cerato, the aforementioned director of the School of Architecture created in 1771. The project envisaged the creation of a raised island in the centre of the area, surrounded by the excavation of a water canal, fed by the Alicorno. It was Simone Stratico who suggested to Memmo that the small canal be dug, not only to drain and carry away excess water, but also to "cut out" the elliptical shape of the central island [Zucconi 2012, 21-33]; according to the project, a double ring of statues of Padua's most famous personalities, illustrious citizens and students of the University, would run along the banks of the canal, in a sort of pantheon.

At the heart of this ambitious project, however, was the hydraulic organisation of the area. Between the 13th and 14th centuries, Fra' Giovanni degli Eremitani, the famous Paduan architect and town planner, had drawn up a plan for a circuit to drain off the stagnant water. On the strength of his advanced technical and scientific knowledge, and with the help of Cerato and Stratico, Memmo set up a complex system of water drainage, which would guarantee the correct use of the space and make use of the earth from the excavations to create the raised area in the centre of Prato. Functions related to performances would take place on the central island, known as Isola Memmia, in honour of its creator.

It should be noted that, at the same time that the Prato project was being drawn up, the Rector of the city commissioned the aforementioned Antonio Maria Lorgna, considered at the time to be the most accredited hydrostatic expert in Venice, to draw up a hydraulic regulation plan for the Brenta and Bacchiglione. We will talk about this plan later, but it is interesting to note that Memmo asked Lorgna to include the creation of a direct link between Padua and the Adige in his plan. The Rector wanted to guarantee the city a new, separate outlet into the Adriatic, independent of the Piovego and Venice[9], and a direct connection to northern markets such as those of Verona and Bolzano. We know

[9] Reference is made to the mouth of the Adige at Rosolina, in the province of Rovigo.

that in the decree of 28 July 1806, Bonaparte himself asked the Commissione Idraulica in Padova to plan the opening of a new canal from Este to the Adige, which would have connected the centre of Padua directly to the river, extending the range of connections on a national scale.

In order to reorganise the Prato area, the marshland was reclaimed and drained, thanks to the creation of an internal circuit of excavations which, thanks to the slopes, would allow the water to flow directly into the Alicorno, which was partly drained in the passage under the Prato area.

Due to the canalisation works, the elliptical shape of the central island was defined almost "forcibly": the first drawing available is dated 3 August 1775[10], sketched by Memmo himself and then drawn in its executive form by Cerato.

In the drawing, the shape of the island is identified by the section of the canal that manages the flow of water from the Alicorno. The elliptical shape of the island, on which reversible structures in stone or wood were to be erected, was reminiscent of a Roman arena, with Memmo and Cerato probably having drawn inspiration from the arenas of Verona and Pola.

It should be pointed out that, in the project, the elliptical layout of the Isola Memmia acted as a container for a series of works: the fountain, the cross created by the two paths, the canal and the double row of statues. The centre of the ellipse is crossed by four avenues crossing the canal on four bridges and intersecting at the centre in a fountain.

From a purely urban point of view, Memmo must have been aware that the renovation of the Prato area would contribute to the creation of a commercial hub in the southern part of the city which would compete with the market area of the two historic squares.

In view of the fair of Santa Giustina, in August 1775, in the name of the Presidenti del Prato, Memmo submitted a request to the Senate for authorisation to proceed with the hydraulic regulation of the Alicorno and *réamenagement* of the Prato. Work began shortly afterwards and lasted just forty-four days: the canal was dug, the island was mapped out and along its elliptical edge, in place of the statues, forty-four wooden workshops were immediately installed, in keeping with the module designed by Domenico Cerato[11].

Later, the wooden workshops were removed from the island and taken outside, but Cerato's idea was to eliminate them completely and relocate all their functions to a single building. The multifunctional building at the end was to be three storeys high, with a large portico. It was to run along the entire southern front of Prato, between Borgo Santa Croce and the municipal road to the Colli. From there it was to turn at a right angle to the property of the Sisters of Mercy. However, the building, which was to become the "urban backdrop'" of Prato, was never built. Memmo's project ended with the construction of the stone structures that replaced the temporary wooden ones. The

[10] ASPd, Miscellanea Mappe, n. 420.

[11] ASPd, Strade, piazze e fabbriche, b. 2

work began in 1775 and was completed only in 1838. The design of an island organised in this way, surrounded by a drainage canal that would have allowed the outflow of water that was difficult to dispose of using the course of the Alicorno, completely changed the area from a physical point of view, improved the water system and offered the possibility of creating a strongly characterising urban element [Bevilacqua 1987, 50-51].

In its conformation, the new Prato project met needs: on one hand, it would have guaranteed the reorganisation of an important area, such as that intended for trade and fairs; on the other hand, it would have allowed the regulation, at least in part, of the water system in the area, by intervening on one of the most important derivations, that of the Alicorno.

In imagining Prato as a new "urban forum", acting as a motor for commercial exchanges, and in conceiving connections on a national scale, such as that between the Alicorno and the Adige, Memmo shows that he had an operational vision that went far beyond the confines of the city and the province. Although the Prato della Valle project cannot be compared to anything similar in the local or national area, Memmo demonstrated direct knowledge of international examples and intellectual horizons that ran far beyond the borders of the Republic.

The roots of Memmo's approach can be found today in the culture of pre-revolutionary and Enlightenment France and late 18th century England, in Vauxhall and Ranelagh Parks and in the corpus of Palladian drawings assembled by Consul Smith, which would later enrich the RIBA Drawings Collections in London. From the perspective of Memmo's own close ties with French culture, we can conclude that the project «constitutes today the Enlightenment metaphor for a possible reordering of the city and society» [Zucconi 2012, 40, translation of the author].

From an urban point of view, in relation to the city's water system, the redevelopment of Prato is therefore the first alternative to the trend of locating all the city's representative and commercial sites in the northern part of the centre, the area near the river Piovego. Memmo's action demonstrates a desire to rebalance the relationship between the central spaces of the city and the northern and southern urban fringes, marked by the presence of rivers and canals.

However, the project for the new Prato della Valle also has another merit: as would happen later with Jappelli and the aforementioned Treves Park, the work on Prato not only solved the issues related to water imbalances, but also allowed the imagination, perhaps for the first time, of the possible applications of hydraulic engineering to architecture and landscape.

IV.2.2 The first intervention on a territorial scale: the Lorgna Plan (1777)

Although partly characterised by the slowness of the Venetian Republic's Magistracies and the lack of economic resources, the years between 1770 and 1790 were years of great

technical and operational vitality, in terms of water-related works, of great ideas that would later be partly taken up by Napoleon's technicians.
The specific projects drawn up by the Collegio dei Savj, the *proti*, the Podestà and the Capitanio of the city were the foundation for broader, more ambitious and often only partially realised plans.
In addition to the plan to organise the water and architectural layout of Prato della Valle, another major plan was drawn up at the same time to regulate the major rivers and protect the city from flooding: Antonio Maria Lorgna's plan to regulate the Brenta and Bacchiglione.
We have already mentioned the figure of Lorgna and his plan of 1777, their centrality in the field of knowledge of water at the time of the Most Serene Republic of Venice, their relationship with Memmo's project for Prato della Valle and their links with the national and international projects devised by Napoleon's engineers.
Born near Verona in 1735, according to sources, Lorgna was taken at a very young age to Tenin in Dalmatia and «*educato e cresciuto a Zara fu davvero, e si sentì dalmata sempre, anche quando la sua reputazione crebbe altissima e Venezia lo coprì di onori*» [12].
In the cultured city of Padua, he studied mathematics, a subject he taught at the Military College of Verona, where he was director and, at the same time, superintendent of the Military Engineering Corps [Maggiolo 1983, 172]. It was probably during his time at the College of Verona that Lorgna had the opportunity to read the works of Bernard Forest de Bélidor [13], whose treatises on mathematics and hydraulics were already a point of reference in the courses of the École Nationale des Ponts et Chaussées, from which the Veronese school drew inspiration.
Lorgna was the most famous hydraulic engineer in the service of the Most Serene Republic of Venice at the time [14], so Memmo asked him to draw up a project for the creation of a direct link between Padua and the Adige, via Este. The link was never built, but the idea of such a large-scale connection was later taken up by the Napoleonic forces, who envisaged the creation of a new canal from Padua to Este and the reopening of an ancient canal to increase the supply from the larger rivers.

[12] Ildebrando Tacconi uses these words to describe him, and they are echoed in the contribution edited by Didi Salghetti Drioli in 1991, p. 308.

[13] Bernard Forest de Bélidor (1698-1761) was a French mathematician and military engineer. Having joined the French army as a young man, Bélidor was appointed colonel and, from 1720, was professor of artillery at the school of La Fère. In 1722, he entered the Académie de Sciences as a student. During his years at the Académie, he published treatises on mathematics and the science of military construction, but it was in 1737 that he published his main work: *L'Architecture hydraulique* became one of the main reference publications for engineers and students at the École Nationale des Ponts et Chaussées in the field of hydraulic science.

[14] He had been the author, in 1771, of a successful scientific publication that compiled his studies on the speed and courses of the major rivers in Northern Italy; see Bibliography of Sources Lorgna 1771.

It was between 1775, the year of Memmo's investiture as Rector of the city of Padua, and 1777 that the Collegio dei Savi commissioned Lorgna to draw up a plan to regulate the Brenta and Bacchiglione, to provide, firstly, good protection against flooding and, secondly, the possibility to link up with navigation towards the Adige.
On 29 March 1777, Colonel Lorgna, an officer in the Engineering Corps of the Republic and in charge of the Military School of Castelvecchio, sent the first report on the river regulation plan to the Venetian magistrates [doc. n. 13 of the Documental Appendix]. Comprehensive and structured, the report states that

> *le operazioni continue, le spese immense fatte dalla Serenissima Repubblica nei passati e nel presente secolo, fanno ad evidenza conoscer che un tal sistema d'acque l'avrebbe sempre lottato contro la natura, e che la sussistenza di tanti canali, doveva mantenersi a prezzo di continue vigilanze ed insoffribili dispendi.*

Essentially, the plan envisaged the use of a number of strategic cuts to regulate the excessive inflow of water into the rivers, which was also linked to the stagnation caused by the movement of the mouth of the Brenta away from the Lagoon and the consequent lengthening of the course and decrease in gradient:

> *Dico che portando l'occhio per una parte alla primaria, radicale necessità d'allontanare la Brenta dalla Laguna,* [...] *l'allontanamento medesimo dovea transeco per inevitabile conseguenza un grande prolungamento di linea ed un rialzamento de fondi superiori* [...].

The basis of the plan was to unite all the waters of the Brenta in one riverbed and to derive «*dalla Brenta* [...] *solo piccoli corsi d'acqua necessarj agli usi della Navigazione e degli Edifizj*».
This would have been possible first of all by making a cut at Limena, to the north of the city, allowing part of the Brenta to flow into the basin at the Brentella diversion: in this way part of the Brenta riverbed would have been left without water and, consequently relieved, would have been able to take the water arriving from the Musone and Piovego, ensuring the necessary water supply for navigation towards Venice; another cut, this time along the course of the Brentella, was planned at Tencarola, to the south-west of the city, to take the water, by digging a new canal, to Bovolenta and, from there, feed it into the Bacchiglione on the Pontelongo Canal.

> [...] *II. Che si prenda la Brenta Vecchia a Limena e si metta la Brenta intera in alveo libero da ogni ingombro ad imboccare e scaricare per la Brentella.*
> *III. Altra operazione integrante è quella di scavare un canale a mano* [...] *cominciando sotto la confluenza del Bacchiglione e della Brentella e mettendo capo al Canal di Pontelongo a Bovolenta* [...].

In the plan, the engineer raises an important point about the number and type of canals in the city: Lorgna believes that there are too many branches and that they slow down the

speed at which the water flows: «[...] *sembra* [...] *che convegna controperare a quanto s'è fatto sin'ora sul fiume Brenta, nel dividerlo, come si osserva, e suddividerlo in tante diramazioni*». However, Lorgna recognises the benefits of their presence, in terms of inland navigation and supply, and envisages their substantial preservation; based on the principle of separating navigable canals from rivers, the engineer recommends their manual excavation, which is forbidden in rivers that are to be left to the work of nature:

> [...] *bisogna adunque rinunciare all'interna Navigazione, che ci procurano cotali diramazioni, alla necessità degli edifici, e di tanti altri usi autorizzati dal bisogno e dal tempo? Non credo, che tutte, o almeno alle più radicali e indispensabili occorrenze s'abbia a rinunciare.* [...] *una diversione voluta dagli umani bisogni controbilancia in qualche modo coll'utilità che approva gli sconcerti che debbono risultare perché sia fatta regolarmente e non si voglia il vantaggio a lieve prezzo. Quindi è che potrebbe stabilirsi a Canone e nuovo principio fondamentale di tener sempre separati i Canali Navigabili de Fiumi, scavando quelli a mano e mantenendoli a mano scavati e lasciando i fiumi al lavoro di natura. Tutto il discapito che porta seco questo sistema consiste unicamente nel dover di fatto in tutto scavare a mano i propri Canali Navigli.*

The engineer proposes to maintain only those derivations that are indispensable for the city's economic activity or useful for regulating water levels, burying all minor derivations serving gardens and monasteries which are not strictly necessary. To this end, Lorgna had planned to build two locks at the confluence of the new section with the Brentella near the Battaglia Canal: the support that would regulate Padua's internal canals, the Piovego and the Roncajette, would be located on the left, while the support for regulating the Battaglia Canal would be located on the right [Bevilacqua 1987, 53]: «*Quindi sulla sinistra penso di erigere la fabbrica per la derivazione dell'acqua per Padova, cioè per il Canal Naviglio di Venezia, e sulla destra l'altra fabbrica per la derivazione dell'acqua per il Canal Naviglio della Battaglia*».

In this way, the water supplies of the city's main internal diversions – the Tronco Maestro, the Naviglio Interno, the Alicorno, the Olmo and the Torricelle canal – would be guaranteed, keeping the old system practically intact, with the two drainage outlets of the Piovego and Roncajette:

> *Il Canale dunque AC [il Tronco Maestro] riceve e acque dalle chiaviche proposte e preso il suo cammino entra in Padova, donde fatte le funzioni principali di Canale per gli Edificj e di Canal Naviglio per mezzo delle diramazioni che succedono al Ponte di Legno esce poi con tutte le acque unite per le due sboccature dei Carmini e delle Porte Contarine e mette capo nel Piovego. E perchè non se ne abbia a dissentire alcuna minima quantità né dal Canal di navigazione di Padova, né dall'altro a Sinistra che va a Ponte Molino, né dal Tronco comune dopo la loro confluenza saranno intestate le cosiddette gradelle di Porciglia e tutte le altre erogazioni minori che non trovassero a restituire l'acqua né Canali Maestri.* [...] *A questo oggetto [alle gradelle di San Massimo] si possono legare insieme i riguardi di questo canale [Ponte lungo] con quelli dei tre condotti, Alicorno, Olmo e Torreselle, che serpeggiano per la città di Padova e prestan diversi Uffizj, in maniera che fatte che abbiano queste loro funzioni nella città, cadano unitamente a*

> *scaricarsi a S. Massimo, e riescano per la Gradella* [...] *e formino poi il Canal di Roncajette cioè corpo a parte, distinto e separato dal Canale Naviglio di Padova* [...].

The system devised by Lorgna in 1777 – the «*terminazioni*», in other words the practical indications for the implementation of the plan, of which he presented to the Collegio dei Savi ed esecutori in 1784 [doc. n. 15 of the Documental Appendix] – aimed essentially at achieving five goals: to keep the Brenta riverbed free of debris; to considerably reduce the number of riverbanks to be maintained, thereby lowering the costs; to move the course of the Brenta away from both the Lagoon and Padua, protecting the city and the countryside from flooding; to guarantee optimal navigation outside and inside the city; to offer Padua new and easier communication with the Brenta and the sea [doc. n. 13 of the Documental Appendix].

In spite of the validity and celebrity enjoyed by Lorgna, the project provoked some criticism, part of which is contained in an unfortunately anonymous document dated 1777[15]. The project was nevertheless subject to the judgement of a series of well-known hydraulic engineers, such as Paolo Frisi from Milan, Simone Stratico from Padua and Leonardo Ximenes from Florence.

While Stratico and Ximenes approved the project as a whole, with only a few reservations on the location of the cut, Frisi was much more negative – fearing a reduction in the water supply to Padua – and even proposed a new route for the Brenta downstream of Padua.

The local community also took part in the technical dispute, which, due to the involvement of various personalities, partially echoes that which occurred a few decades later in relation to the project for the Canal de l'Ourcq[16]. A proposal was made by a technician from Padua, Munaretto, which consisted of proposing a straight cut from Limena to Codevigo, near the Chioggia valleys.

The Collegio dei Savi commissioned the etcher Ignazio Colombo – already famous in France for the publication of portraits of Marie Antoinette, the Dauphin Louis XVII and Robespierre – to draw up a new map containing all the indications provided by Frisi, Ximenes, Stratico and Munaretto, to be given to the Deputies of the city of Padua, who were responsible for making the final decision [Bevilacqua 1987, 53].

It is likely that the reason for this excessive slowness in making certain decisions regarding the reorganisation of the territory's rivers was linked to the risk, foreseen by the Collegio, of upsetting the economic and social organisation of a city which, as we know, had based its entire existence on water. Reviewing the organisation of external sections and internal derivations could have affected not only the economic and industrial organisation but

[15] ASPd, Acque diverse, b. 53.

[16] The plan drawn up by Lorgna, with additions and amendments by Stratico, Ximenes, and Frisi was also analysed in 1783 by the Paduan abbot Antonio Belloni; see in Bibliography of Sources Belloni 1783.

also that of the city. It is therefore easy to see the outlines of a conflict emerging in this situation, one that was probably historically and socially based.

About ten years after the presentation of Anton Maria Lorgna's project, the debate about it, regarding the greater or lesser applicability of the principles it contained, had not yet dissipated. On the contrary, the number of people involved in the vicissitudes had grown. In 1786, an anonymous work, later attributed to the venetian Girolamo Ascanio Giustinian (1721-1791), entitled *Pensieri d'un cittadino sul fiume Brenta*, was published in Padua. The work was accompanied by a map, which was extremely eloquent in its completeness. The map was based on a survey carried out by a municipal commission in 1786 and it precisely outlined the entire hydrographic network of the province of Padua, as well as the outlets of the major rivers into the Lagoon.

Structured in this way and highlighting the line of the outer city walls and that of the inner canals, the map used different colours to show the various projects for regulating the rivers: drawn up by Lorgna, Frisi, Ximenes and Stratico, and Munaretto, as well as some of the author's own ideas. The map contained in the book by Giustinian is of fundamental importance because it considers the imbalances in the Bacchiglione-Brenta hydrographic system, with all the sections created over time – the Piovego, the Brentella and the artificial canals of Bassano – in order to develop a new design. Giustinian conceived the Padua river basin as a whole, making it clear that every intervention would cause changes in all parts of the system, even the most distant ones.

Shortly before the fall of the Most Serene Republic of Venice, the regulation of the major rivers had still not been carried out. Given the precarious hydro-geological conditions of the territory at the time, along with the inability to decide which was the best project, the Collegio was forced to entrust an official with the examination of the projects submitted up until then. It was in 1790 that the College entrusted this task to Angelo Artico: assisted by a map drawn up for the occasion, showing all eight projects presented[17], Artico studied all the projects, ending up discarding them all [Bevilacqua 1987, 54], considering them unsuitable for the needs of the area.

It is worth remembering that, a few years later, Angelo Artico created another project to regulate the rivers[18], which was approved and implemented by imperial decree by Bonaparte himself on 27 June 1811. As we know, Artico's plan was never implemented either, and the city had to wait until 1835 for the implementation of the Fossombroni-Paleocapa Plan and the creation of the Canale Scaricatore, which took care of the outflow of water by bypassing the city and relieving the flow of the Brenta and Bacchiglione.

Although the plan drawn up by Lorgna was never implemented, it was thanks to its publication that the technical community began to talk about the systematic regulation

[17] Biblioteca Civica di Padova, B.P. 1946/4.

[18] The project is contained in the critical volume by Girolamo Cristiani, printed in Milan in 1795; see Bibliography of Sources Cristiani 1795.

of the rivers, the need for new sections, the construction of new drainage canals and the continued conception of inland navigation in the city as an economic and social resource for the citizens.
Based essentially on the need to regulate the course of the rivers and defend the city and province from flooding, Lorgna's plan actually provides a clear picture of Padua's urban and territorial water structure. By clarifying the importance of using the city's internal water network to guarantee a proper supply for economic and transport purposes, Lorgna pioneered a concept, that of preserving the existing urban canals, which would later be taken up and "defended" by the French: as we know, as part of their operations the French always tried to devise a flood defence plan that would allow them to preserve the existing water structure within the walls as much as possible, often taking inspiration from Lorgna's ideas.
The plans for a direct link between Padua and the Adige were also partly taken up by the Napoleonic forces, who envisaged creating a new canal from Este, already effectively connected to the centre of Padua, as far as the to the Veronese river. In this way, as Memmo had already imagined, it would be possible to create a direct link to the north, replicating, on a smaller scale, what had already been done in France: with the construction of the Canal de l'Ourcq and its connections to other national waterways, it would have been possible to connect Paris to Belgium, Flanders and the North Sea.
The figure of Lorgna is a further *trait d'union* between France and Italy, reinforcing the links between the ancient tradition of hydraulic engineering in the Padua area, the French scientific culture of the late 18th century and the technical work conducted under Napoleonic rule.

IV.2.3 Tradition and new urban interventions. For a water-based Europe

Geographical centre of gravity of a territory as vast as the former republican Veneto, extremely rich but profoundly unstable in terms of water, the subject of long and rigorous scientific research in the decades preceding the fall of the Most Serene Republic of Venice, the territory of Padua was a centre of study, experimentation and planning of fundamental importance for the French.
As we have seen, the emperor, the viceroy, the ministers, the professors of the École des Ponts et Chaussées and the local technicians and administrations imagined making it a hub for connections on a national and international scale, like Paris beyond the Western Alps.
Morphologically very different from the future Ville Lumière, where the urban canalisation system was practically created *ex novo* during the Napoleonic era, Padua may be its Italian counterpart in political, administrative and technical spheres, boasting an ancient knowledge of water: from the medieval urban canalisation works, to the specific interventions of the early 18th century, through to the major projects of the late 18th

century. A city, we might say, «[...] dependent solely and economically on an admirable but labile artificial water balance, which has achieved private prosperity, but above all a rich administrative wisdom» [Bevilacqua 1989b, 48, translation of the author].
The existence of such an old and solid tradition of water cities, however, would not suffice to justify today the attention that Napoleon reserved for the Veneto area in general and Padua in particular.
We know that in the aforementioned case of Bologna, the decisions made by the French regarding water were radically different. Although the city of Emilia, which was an integral part of the Kingdom of Italy, was nevertheless at the centre of transport routes and national connections between the north and south of the peninsula, and had an equally long-standing tradition of knowledge in terms of hydraulic engineering, the French government proceeded to bury the Navile canal in 1811. Having always guaranteed the city a direct link with Ferrara and therefore a fundamental outlet to the Adriatic, it was the main artery of Bologna's water system: its burial during the Napoleonic era created an irreversible rupture in the city's water system, which was dismantled shortly afterwards. Not exploited for its water potential, Bologna became one of the centres of greatest concentration of the Dotazioni della Corona, i.e. the immovable, agricultural and natural possessions of the Empire. As part of the so-called *Domaines extraordinaires*, the Emilian city became the residence of many important imperial functions – representative or ministerial seats – often housed in old buildings in the city, in old factories or in the ecclesiastical buildings requisitioned by Napoleon's suppression orders[19].
Napoleon's decisions regarding the maintenance, burial, preservation and enhancement of the water network on the imperial holdings seem to have been studied and carefully planned: the technical decisions made Bonaparte, although not applied in the same way throughout the territory, seem to have been based on precise aims, which took into account, above all, the greater or lesser strategic importance of the areas in terms of water connections. In the system envisaged by Napoleon, Paris, the capital of the Empire, was to be the vital centre of the water project launched with the construction of the Ourcq system and the connections planned or made with other parts of the country and neighbouring territories. Padua, on the other hand, would have gone from being a city of water "by tradition" to being one of the main centres of navigation "by choice", in a structure that worked at first on an urban and territorial scale, then on a national and finally an international scale and that could ideally connect the north and south of Italy and the east and west of the imperial territories in the great and ambitious system of the water-based Europe.

[19] See, in this regard, some documents kept in the Archives Nationales de France, in particular: Archives Nationales, O/2, Maison de l'Empereur, cc. 1238, 1248.

Appendix

Documental Appendix

1.

1494, 30 July, Venice

In the letter, the Doge asked for urgent measures to be taken to facilitate the navigation of the Naviglio – compromised by the mills that lowered the water level – by the boats and *burchi* that transported wine and timber from Bassano to Venice: «*vogliamo, e vi ordiniamo, acciò provvediate, e facciate, che il fiume Brenta da Limena sino Padova con tal modo non si renda innavigabile, ma dobiate poner tale modo, et ordinare quale vi parerà necessario, acciò a le dette Legne da fuoco et detti Legnami da Lavoriero nel medesimo istante possano passare*».

ASVe, Savj ed esecutori alle acque, Atti, b. 541, Copia della lettera del Doge Agostino Barbarigo a Marin Garzoni e Marin Leoni, Podestà e Capitanio di Padova.

2.

1523, undated, Venice

In the letter, the Captain of Padua, Francesco Donado, informs the Doge that he has appointed Giacomo Dall'Orologio as the technician for the construction of the Porte Contarine: «*Ignegnero nominato Giacomo da Relogio in far la commoda Navigazione di detti Barcaroli, et altre barche, et burchi, che potranno passare in Torreselle, e alle Contarine senza lo esser più bocca alcuna*».

ASVe, Savi ed esecutori alle acque, Atti, b. 541, Padova. Canali e Molini, Copia della lettera del Capitanio di Padova Donado al Doge Andrea Gritti.

3.

1719, 4 January, Padua

In the letter Lorenzo Mazi announces to the Doge that «*l'unico e necessizoso rimedio sarebbe stata l'escavazione del Canal, il letto del quale da molti e molti anni si hora presente si è imbonito per le acque torbide che passano per detto Canale, che vengno dal fiume Brenta, et Bachiglione*».

ASVe, Savi ed esecutori alle acque, Atti, b. 541, Padova. Canali e Molini, Copia della Lettera di Lorenzo Mazi Perito Pubblico della città di Padova al Doge Giovanni II Corner.

4.

1720, undated, no location

The handwritten «*Informazione*» summarises all the events surrounding the construction of the Porte Contarine, of the *portoni* beside them.

The chronicle reports that, in 1523, following sixty years of complaints about the difficulty of navigating the canal for boats transporting goods to Venice (cf. doc. 1), the decision was made to build the Porte Contarine and, next to them, the *portoni* «*che col aprirle, e chiuderle alternativamente si dà tragitto alla Navigazione, e nel tempo istesso si tien ferma e incassata l'Acqua del fiume per facilitare, e render continuo, e libero il corso delle Barche senza più verun incomodo*», transitable thanks to the payment of a toll (cf. doc. 2). In the centuries that followed, however, the Naviglio was filled with debris («*rovinazzi, tereni, cenere, scovazze*»), occuring both naturally and as a result of human intervention, which once again made navigation difficult and caused considerable economic damage to boatmen and merchants. From 1719 onwards, chronicles report that it was felt that the only solution to the problem was a further excavation

of the same canal (cf. doc. 3): «*si vede fatta nelli due altri Rami, uno, che si stacca alle Bovette del Bastion Alicorno, e scorrendo per la città, passa per il Pra della Valle e termina agli Edifici del Magio e del Ponte Corbo, l'altro alle Porte di Accademia, dette dell'Olmo, scorre per la città dietro agli Orzesini di Vanzo e termina agli Edifizi al Prato della Valle*».

The excavation of the canal for navigation was to be coordinated with that of the Canale di Este. As of September 1775, however, the excavation had still not been carried out, despite requests sent to the Doge by numerous groups of boatmen and experts. The problems were generated mainly by the timing of the calculations for the excavation and the search for places to deposit the excavated sludge.

ASVe, Savi ed esecutori alle acque, Atti, b. 541, Padova. Canali e Molini, Informazione riguardante il Canal di navigazione di Padova dal Ponte di Legno sino alle Porte Contarine.

5.

1749, undated, Paris

The lawyer Poitevin du Limon sends King Louis XV the *Memoire pour les intéressés à la conservation des eaux de la rivière de Biévre, dite des Gobelins,* requesting the conservation of the waters of the Biévre, which De la Martiniere, *premier Chirurgien du Roy*, wanted to bury to feed another canal. Poitevin du Limon's main concern was the slowing down of the manufacturing activity of the Gobelins:

il résulte que, pendant que le M. de la Martiniere occuperont la rivière à remplir son canal, le moulin de Biévre & tous les autres moulins chaumeraient pendant des huit & quinze jours, & peut-être pendant un mois & plus; les manufactures des Gobelins, les Teinturiers en grand & bon teint, les Tanneurs & les Mégissiers manqueraient d'eau pendant tout ce temps; ce qui interromprait les travaux & le commerce de toutes ces manufactures, au préjudice du Public & de l'Etat. [...] *En un mot tous les avantages, toutes les commodités que le public, & l'Etat même retirent de la rivière des Gobelins, feraient engloutis dans le nouveau canal projeté par le M de la Martiniere* [...].

ANFr, F/14 Travaux publics, c.183, Généralité de Paris. Cours d'eau, moulins, dessèchements, canaux et rivières, navigation, bacs à Paris, rivières des Gobelins.

6.

1753, undated, Padua

In the letter, the city's Proto-Savio announces «*disordini occorsi al Portello che misero in pericolo le publiche fabriche per uso della Dogana e de' Corrieri, la publica strada e diverse fabriche particolari*». Following an inspection, the Proto presents what he considers to be, «*i rimedj opportuni*» – meaning small elevations, demolitions and reinforcements to increase the strength of the embankments – for the following sites «*del Porto col Ponte, il porto vecchio ed il Porto nuovo*».

ASVe, Savi ed esecutori alle acque, Atti, b. 976, Brenta. Regolazione 1752-1756, 1761-1765, Lettera di Giacomo Savio, Proto di Padova, al Podestà e al Capitanio su lavori da eseguire nell'area del Portello.

7.

1766, 22 March, Venice

In the publication, the decree refers to a law approved by the Senate on 7 August 1693, relating to some work to raise the embankments carried out at Ponte Molino, Torreselle, S. Nicolò and Roncajette in the same year. The edict of 1766 requested that the situation not be altered in any way and that no wall be built along the Roncajette Canal.

Il Serenissimo Prencipe fa' sapere, ed è per Ordine degl'Illustrissimi, & Eccellentissimi Signori Savj, et esecutori all'acque.

Col decreto 1. corrente essendo stato pienamente approvato dall'Eccellentissimo Senato, e comandato con l'autorità sua, che sussista, e da chicchesia non si alteri tutto quello, che di ordine del fu N.H. Sier Zuanne Donà Capitanio, e Vice Podestà si operò dal Proto Alvise Giacon tanto al Ponte Molin abbassandovi di cinquanta oncie circa li Smergoni, ed allargandovi di nove oncie circa li Redesti per ridurli quali erano innanzi l'ultima già un Anno praticatavi arbitraria innovazione, quanto alle Torreselle riducendo a ventuna oncia le ventisei di un Edificio, a trenta le cinquantotto del secondo, a ventuna le quaranta del Terzo, a ventisette le quarantasei del quarto, e a dieciotto le ventuna del quinto e del sesto, allungandovi nello stesso tempo a tutti li medesimi edificij le porte in modo, che non le sormontino le Acque in escrescenza; così approvato essendo stato dall'Eccellentissimo Senato il lievo del Cassero praticato alla Bova dei Molini di Roncajette, nonché la spianconatura eseguita alla Bastarda dei Molini di S. Nicolò, e lo spinatamento del Penello trovato al primo Arco di quel Ponte: il tutto rispetto questi due ultimi siti, in relazione alla Terminazione di questo Magistrato 7. Agosto 1693.

Si fa pubblicamente intendere, e sapere, che non via sia Proprietario, o Livellario Affittuale, o Monaro, o altro Operaro qualunque, il quale ardisca alterare, o diversificare in minima parte tutto ciò che come si è detto di sopra fu dalla mano esecutrice del Proto Giacon operato nei nominati quattro siti Ponte Molin, Torreselle, S. Nicolò, e Roncajette di commissione del fu Rappresentante Donà, essendo stata ogni cosa approvata dall'Eccellentissimo Senato, e della Sovrana sua Autorità, essendo comandato che sussista e nessuno ardisca porvi mano ed alterarla, tanto meno di alzarvi mai nessuna opera di Muro, come pareva a volersi arditamente tentare nel Canal di Roncajette.

Trovandovisi però nella visita, la quale si prepara, innobbedienza o trasgressione sarà irremissibilmente sul fatto levata la pena di Duc. Duecento all'Affittual, o Monaro, e preceduto sarà anche contro chi gli avesse dato comissione (se mai vi fosse, o sotto di lui pretesto coprir si volesse l'Affittuale, e il Monaro) negli altri severi modi che si riputeranno opportuni a correggere l'innobbedienza. E il presente sarà pubblicato tanto nella Città di Padova quanto in S. Nicolò, e Roncajette, e affisso in ognun delli Molini, ed Edificj per la chiara sua intelligenza, ed esecuzione pontuale, ed esatta: in riserva questo Magistrato di aggiunger anche di più, se occorressero a sistema migliore de medesimi Molini, ed Edificj dipendentemente sempre da comandi dell'Eccellentissimo Senato et sic &c.

E sarà rassegnato per l'Approvazione.

Giulio Contarini Savio all'Acque.

Z. Marco Calbo Proc. Savio all'Acque.

Andrea Querini Savio all'Acque.

Giacomo Corner Esecutor all'Acque.

Benetto Grimani Esecutor all'Acque.

Girolamo Ascanio Molin Esecutor all'Acque

Z. Andrea Poletti Nod. All'Acque.

Approvato con decreto dell'Eccellentissimo Senato de dì 22 Marzo 1766.

ASVe, Savi ed esecutori alle acque, Atti, b. 541, Padova. Canali e Molini.

8.

1766, 5 June, Padua

In the first part of his report, Giuseppe Rossi, a public mathematician in charge of examining the layout of Padua's water network and, above all, assessing the reasons for the continuous flooding, describes the

function of urban water and the cycle followed by it during supply and drainage, listing the names and layout of the water network made up of rivers, major canals, minor canals and drainage canals.

Illustrissimi ed eccellentissimi Savj, ed esecutori alle Acque.

Dovendo trattare in ordine alla venerata Commissione [...] *del giorno 18 Marzo passato, delle inondazioni, che da molti anni si son rese più frequenti, e più estese sopra una considerabile parte della Città di Padova, indicherò in primo luogo le acque, che naturalmente vi capitano, ed in secondo luogo esporrò la loro divisione, e diramazione all'interno della Città per uso di navigazione, mulini, spurghi di panni, ed altri edifizj, e finalmente la riunione di tutte esse acque in altri Canali e Fiumi, che perché servono al loro scarico, si chiameranno scaricatori, per indi riferire, quali operazioni potrebbero perennemente eseguirsi atte a rendere la Città stessa meno soggetta ad essere inondata ne' tempi di Piena. Dico meno soggetta, e non affatto libera, mentre riverentemente credo impossibile, dopochè gli abusi, hanno preso così fermo piede, impedire, che le strade, e le abitazioni più basse della Città non vengano ne' detti tempi inondate, qualora non si volesse pensare* [...] *a nuovi Tagli e Canali che quanto riuscirebbero dispendiosi, altrettanto, pria che se ne vedesse l'effetto, anderebbero soggetti a molte inopinabili difficoltà, come è succeduto, e succede in tutti i cavamenti di questo genere, fatti per obbligar i fiumi a correre per lavei, che non si sono essi naturalmente formati.*

Le acque, ch'entrano in Padova, sono quelle, che vi convoglia il Canale, che dal Bassanello prende il suo corso verso essa Città, e che chiameremo col nome di Canale di Padova [the Tronco Maestro].

Viene formato dalle acque del Bachiglione unite a quelle della Brentella; non già da tutte esse acque, ma da quella sola parte delle medesime, che col mezzo del nostro Partitore di legno resta divisa al Bassanello, e scorre verso Padova, mentre l'altra va a formare il Canale detto della Battaglia. Oltre questa parte di acque, altre non ve ne sono ch'entrino in Padova, e perciò tutti gl' interni Canali [...] *non sono che diramazioni primarie, e secondarie del nominato Canale di Padova* [...].

Non è questo il luogo di prendere in esame cadauna delle dette diramazioni, basterà per ora osservare [...] *che quattro sono i Canali, che si diramano immediatamente dal nominato Canale di Padova, la Bovetta dell'Alicorno, quella dell'Olmo, o dell'Accademia, il Canale di navigazione, e la Bovetta di s. Leonardo; e che la Bovetta delle Torreselle è quel solo, che si suddivide da uno de' già diramati, vale a dire dal Canale di navigazione, lasciando apparte* [...] *alcune picciole diversioni di acque* [...] *fatte a privato commodo di Monasteri, e Communità Religiose, dell'Orto Botanico, e de' Mulini detti del Santo.*

Fatte le suddette quattro primarie diramazioni, tutta l'acqua, che versa nel Canale di Padova viene insoppata a Ponte Molino per uso di quei Mulini; caduta da' quali s'unisce al Canale della Bovetta di S. Leonardo, ed insieme escono dalla Città per le Gradelle dei Carmini. Continuando il loro cammino, e girando intorno alle mura, raccolgono inferiormente alle Porte Contarine le acque del Canale di Navigazzione, a risserva di quella parte, che superiormente entra nella Bovetta, e Canale di Torreselle, che è l'unico, che si suddivide da esso Canale di Navigazione, il quale, come si è detto, è uno de' già diramati.Tutte queste acque formando un corso solo, proseguono il loro corso alle Gradelle di Porciglia, ove di bel nuovo si diramano in due Canali, uno che forma il Piovego verso Levante, e viene a Stra, e l'altro verso mezzo giorno, che scorre a S. Massimo.

Nel tronco compreso tra Porciglia e le Gradelle di San Massimo si raccolgono tutte le acque delle tre bovette Alicorno, Olmo, e Torreselle, e così ingrossato esce dalla Città per le suddette Gradelle, ed entra dell'antico Ramo del Bacchiglione, ora chiamato Canale di Roncajette. A Bovolenta si scarica nel Bacchiglione inferiore, vale a dire in quel Canale che principia all'Arco di mezzo della Battaglaia e va liberamente a sboccare nella Conca di Brondolo.

E decco, eccellentissimi signori, che due sono gli Scaricatori delle acque di Padova, uno il Piovego e l'altro il Canale di Roncajette, nel quale ultimo, sinchè si sono potute scaricare in buona parte le acque della nominata Città, non si sono mai vedute innalzarsi al segno di superare a soglia della Porta d'Ognissanti detta del Portello, come si è osservato nelle prossime passate escrescenze: ne' hanno mai incomodato tante

strade, Luoghi ed Abitazioni, quante essersi ritrovate sotto acqua nella piena dello scorso Novembre rilevati dalla diligente relazione de' due Signori Proto-Medico Trevisan, e Medico Francesco Leonessa.

Impedito il canale del suddetto Scaricatore per gli ostacoli, che furono in esso frapposti, ed impoverito anche dagl'impedimenti de' Canali interni, che lo alimentano come si rileva dalla perizia Ferracina e Roselli 8 gennaio 1765, e dall'altra Brandolese e Giacconi 24 aprile prossimo passato, ne viene per conseguenza, che il Piovego nelle Ordinarie piene deve smaltire non solo quella quantità di acqua, che è proporzionale alla sua Capacità, e alla sua primigenia instituzione di Canal manufatto, ed inserviente soltanto alla Navigazione, ma oltre le proprie sue acque scaricare deve la non sua parte, vale a dire quella che in forza degli accennati abusi non può più scorrere per l'alvo scaricatore, o sia Canale di Roncajette.

Così sbilanciato il sistema delle acque di Padova per la sforzata introduzione delle medesime nel Piovego, nacque, che dovendo esse acque per legge di natura pareggiarsi con quelle che dalla Brenta Vecchia sono convogliate a Stra in maggior corpo ed in maggiore altezza di pleo non puà il Piovego scaricarle, se dentro Padova non si rendano tra in quattro piedi più alte del segno, a cui giungevano, allorchè non era impedito il Canale di Roncajette, come si rileva da tre in quattro piedi di più d'altezza, che acquistano, come si è detto, al Portello, in confronto di quella, che colà avevanotrenta in quaranta anni sono.

Ciò detto in correlazione alla mia umilissima carta presentata a questo eccellentissimo Magistrato sotto il giorno 28 Marzo 1763, o si vuole che il Canale del Piovego porti le acque sue proprie unite a buona parte di quelle, che scorrevano prt il canale di Roncajette, o si vuole che restino ripartite fra ambidue i nominati Scaricatori. Se si vuole, che il Piovego porti, oltre le acque sue proprie, buona parte di quelle che dovrebbero scorrere pel Canale di Roncajette, si deve anche soffrire, che la Città resti inondata, e che gli Argini di esso Piovego nel miserabile stato in cui si si ritrovano vengano di tempo in tempo squarciati, come è successo nello scorso Autunno nel sito appunto che is era predetto sin dal 1763.

Ma se si vuole che restino ripartite fra ambidue i suddetti Scaricatori, perchè la Città resti sollevata, e si moderino tutti i suddetti pericoli, i tal caso devono togliersi i disordini, che si sono introdotti, non meno nel suddetto canale di Roncajette, ma ancora quelli che si ritrovano negli altri canali interni ed esterni della città colà introdotti dalla accennata indisciplina, in cui poco a poco è caduto il sistema per non esservi stata presidenza stabile alcuna, che sin'ora abbia particolarmente vegliato alla di lui conservazione.

Al qual passo mi ritrovo in obbligo di rassegnare a VV.EE., che ad oggetto di ben informarmi delle cause, che hanno sbilanciato il corso di quelle acque, que' nobili signori reputati non hanno [illegibile] attenzione alcuna nel farmi somministrare tutti que' Lumi, che più per caso che per disegno si ritrovavano avere, e che per mia parte non ho mancato di comunicare à medesimi tutto ciò che m è riuscito di rilevare, e pensare non meno intorno a' disordini, ma ancora intorno a' provvedimenti che mi sono sembrati opportuni ss' riguardo al presente che all'avvenire.

Con queste vedute si è chiaramente scoperto che come dalla sopradetta mancanza di presidenza ha preso origine ed incremento la confusione, in cui è caduto il sistema de' suddetti Canali, così dalla medesima nascerebbe, che quantunque fossero adottati molti valevoli provvedimenti, sarebbe facile, che o non fossero perfettamente eseguiti o per la molta distanza e per non esservi chi vegliasse contro la introduzione degli abusi, cadessero in dimenticanza le provvide Leggi che fossero stabilite per la loro conservazione, come l'esperienza ha purtroppo fatto conoscere nei' mulini di Ponte Molino e negli altri di S. Nicolò, e Roncajette a fronte di replicare terminazioni e proclami di questo eccellentissimo Magistrato e della solenne Terminazione 1586 degli eccellentissimi delegati Savj alle Acque e Provveditori alle Fortezze. Quindi gli stessi signori deputati della Città sono entrati nella massima, che qualcosa anche dalla maturità di VV.EE. Fosse creduta necessaria la suddetta Presidenza e fosse comandata dalla Pubblica sovrana Autorità, si assumerebbero riverentemente il Carico della medesima, col far eleggere dal loro Consiglio quel numero de' più idonei ed accreditati cittadini, che fosse stimato più conveniente come la Città stessa non mancherà di più precisamente spiegarvi all'occasione.

Sopra questo fondamento mi sono, con maggiore speranza, applicato ad esprimere con ossequio il mio modo di pensare, che si è ritrovato conforme a quello dei suddetti Signori Deputati per ricondurre le cose non già nello Stato in cui erano ne' Secoli trasandati (mentre ciò non sarebbe praticabile, ne' forse utile alle odierne circostanze) ma bensì per richiamarle, se è possibile, a quel sistema, che correva al principio del corrente secolo; e ciò col far io de' lumi somministratimi parte da questo eccellentissimo magistrato e parte dalla detta città, e delle Perizie che mi furono consegnate, e di quanto ho potuto conoscere e verificare con gli occhi proprj.

Per far ciò con quale ordine, produrrò gli sconcerti che avrò ritrovato in ciascuno dei nominati Canali e, nello stesso tempo, a tenore della Venerata loro Commissione, rassegnerò quei provvedimenti, che da me e da altri sono creduti più necessarj e a chi ne appartenga la spesa.

Mi duole, eccellentissimi signori, di dover in prevenzione avanzare, che come tutto il vantaggio che può sperarsi, si spera della regolazione di molti abusi, che si sono l'uno dopo l'altro introdotti, così questo metodo cade nella difficoltà, che molte operazioni si rendono necessarie per ricavarne il frutto che si desidera: e perciò se il fare una cosa sola va il più delle volte soggetto a molti lagni, controversie ed opposizioni, quanto più non sarà difficile il farne molte, e di queste non poche intralciare nel privato interesse, e che il tempo e la trascuraggine hanno quasi autorizzato ome legali?

Io però nel rassegnarle alla maturità di VV. EE. Crederò di aver supplito al mio preciso dovere, che è di non atcer null di ciò, che può servire di lume alle sapientissime loro deliberazion".

The document is followed by the second and third parts, in which Rossi describes the problems affecting the individual canals – the Tronco Maestro, Bovetta dell'Alicorno, Bovetta dell'Olmo, Naviglio Interno, San Nicolò and delle Roncajette canals, canal from San Massimo to Roncajette, and the «*provvedimenti che si rendono necessari per ripararli* e *chi debba farne la spesa*».

ASVe, Savi ed esecutori alle acque, Atti, b. 541, Padova. Canali e Molini, Relazione del Pubblico Matematico intorno alle Acque di Padova, Parte prima.

9.

1767, 27 May, Padua

The plan in question lists the «*operazioni che si rendono necessarie a condur l'acque della Bovetta Alicorno nel Canal di S. Massimo dietro alle mura di Padova a sollievo del fiume che viene dal Bassanello ed inonda la Città*». This would have been possible thanks to the construction of a canopy with gates to regulate the inflow when the water level rose and the excavation of another channel for the external outflow of water.

ASVe, Savi ed esecutori alle acque, Atti, b. 541, Padova. Canali e Molini, Piano presentato al Magistrato alle Acque per condurre la Bovetta Alicorno dietro alle mura di Padova.

10.

1767, 27 September, Padua

In their letter, the owners of some millstones ask the city government to carry out consolidation work on the banks of the S. Chiara canal, near the Monastery. Rocks and stones dislodged by floods were preventing the normal flow of the water and the successful navigation of the fundamental canal «*della quale conosciuta molto importante la conservazione*».

ASPd, Acque, b. 11, f. XII, Canali interni della città di Padova, Canale di Santa Chiara, 1767-1768.

11.

1775, 8 May, Padua

The Committee of Barcaroli and Burchieri of Padua, Este, Montagnana and Vicenza called for excavation «*del canale unico navigabile dal Ponte di Legno sino alle Porte Contarine*» of which there are «*quasi innumerevoli li vantaggi*».

ASPd, Acque, b. 12, f. IV, Escavo del Canale interno dal Ponte di Legno alle Porte Contarine.

12.

1775, 1 August, Padua

Alessandro Duodo, magistrate of the Savi and executors of the waters, writes to Andrea Memmo, Provveditore of Padua, about the need to consider the possibility of also excavating the canal of Este «*da cui al caso non si potrebbe prescindere, se s'intendesse di architattar cosa utile ne'grand'oggetti della navigazione*» as well as that «*esteso dal Ponte di Legno sino alle Porte Contarine*».

ASPd, Acque, b. 12, f. IV, Escavo del Canale interno dal Ponte di Legno alle Porte Contarine.

13.

1777, 29 March, Verona

Colonel Antonio Maria Lorgna, an officer of the Corpo del Genio of the Republic of Venice and head of the Scuola Militare di Castelvecchio in Verona, having been commissioned to do so, proposes to the Magistrato delle Acque a plan for the unitary regulation of the river Brenta, which had always caused major flooding in the city of Padua and the surrounding area.

Piano di regolazione sistematica della Brenta del sig. Colonnello Lorgna

Se i principj fondamentali della scienza delle acque [...] *non concorressero insieme a stabilire che il sistema d'un fiume, che corre torbido, si sbilancia con le derivazioni,* [...] *le acque disunite esigono maggior pendenza delle unite per tenere incorporate le materie che conducono*[...]*,se tutto questo eccellentissimi signori non fosse per altra parte così vero com'è esempio memorabile di fatto* [...] *sarebbe l'attuale costituzione delle acque della Brenta che bagnano i territori conterminanti le Venete Lagune.*

[...]

Ma le operazioni continue, le spese immense fatte dalla Serenissima Repubblica nei passati e nel presente secolo, fanno ad evidenza conoscer che un tal sistema d'acque l'avrebbe sempre lottato contro la natura, e che la sussistenza di tanti canali, doveva mantenersi a prezzo di continue vigilanze ed insoffribili dispendi".

[...]

Dico che portando l'occhio per una parte alla primaria, radicale necessità d'allontanare la Brenta dalla Laguna, necessità assoluta, cui doveva e dovrà sempre cadere ogn'altro riguardo, l'allontanamento medesimo dovea tran seco per inevitabile conseguenza un grande prolungamento di linea ed un rialzamento de fondi superiori, e riflettendo per l'altra al bisogno di mantenere tuttavia aperta una comunicazione per acqua con la Laguna medesima [...]*, si vede, che non era cosa facile da quel principio di combinare in un sistema solo cotali oggetti con le Leggi della Natura. Forse le osservazioni sull'opera dei fiumi non erano ancora così copiose in quei tempi, sicché dessero norma a quegli architetti d'acque per le provvidenze da prendersi in quelle circostanze, e forse non avevano tanti errori d'architetti anche passati, che potessero documentargli come ai nostri* [times]*".*

[...]

[It needs to] *rintracciare un altro regolamento, che più s'adatti alla Legge de' fiumi, conciliando per quanto è possibile gli oggetti sopradetti, a quali non può rinunciarsi. Regolamento per conseguenza, in cui la natura, non possa, che lentissimamente ricondurre la cosa a nuovi sconcerti: quest'è quello cui mi prefiggo di soddisfare nel difficile incarico, che le VV.SS. si sono degnate di addossarmi di una sistematica regolazione delle acque della Brenta.*

[...]

[...] *sembra, Eccellentissimi Signori, che convegna controperare a quanto s'è fatto sin'ora sul fiume Brenta, nel dividerlo, come si osserva, e suddividerlo in tante diramazioni.* [...] [It needs] *adunque rinunciare all'interna Navigazione, che ci procurano cotali diramazioni, alla necessità degli edifici, e di tanti altri usi autorizzati dal bisogno e dal tempo? Non credo, che tutte, o almeno alle più radicali e indispensabili occorrenze s'abbia a rinunciare.*

[...]

Ed ecco un altro principio su cui s'appoggia l'orditura del mio Piano. Il primo che ho detto dell'unione delle acque voluta dalla natura, esclude veramente ogni diversione; ma una diversione voluta dagli umani bisogni controbilancia in qualche modo coll'utilità che approva gli sconcerti che debbono risultare perché sia fatta regolarmente e non si voglia il vantaggio a lieve prezzo. Quindi è che potrebbe stabilirsi a Canone e nuovo principio fondamentale di tener sempre separati i Canali Navigabili de Fiumi, scavando quelli a mano e mantenendoli a mano scavati e lasciando i fiumi al lavoro di natura [so the rivers remained free and the branches even]. *Tutto il discapito che porta seco questo sistema consiste unicamente nel dover di fatto in tutto scavare a mano i propri Canali Navigli.*

Ma innumerevoli all'opposto possono dimostrarsene i vantaggi. Ed ecco in che consiste il mio dinotissimoPiano.

Unire in un solo alveo tutte le acque della Brenta.

Derivare dalla Brenta con imboccature regolate solo piccoli corsi d'acqua necessarj agli usi della Navigazione e degli Edifizj.

Proposti così i sommi capi andrò esponendo i mezzi [...].

[...]

Trattando dunque quanto al primo dell'unione delle acque della Brenta, esige egli diverse operazioni.

I. *Che si prenda la Brenta Vecchia a Limena e si metta la Brenta intera in alveo libero da ogni ingombro ad imboccare e scaricare per la Brentella.*

II. *Che si allarghi la Brentella sicchè contener possa l'acqua della Brenta tutta, raddrizzandovi qualche svolta risentita se ne avesse, e mettendo in stato quell'alveo di contenere anche le acque aggiunte. Per assegnare una ragionevole larghezza a questo tronco da Limena alla confluenza del Bacchiglione* [...] *ho riflettuto che essendo le larghezze dei fiumi non arbitrarie conveniva spiare quale larhgezza aveva il fiume medesimo in circostanze simili a quelle nelle quali dovea porsi nell'alveo della Brentella.* [...]

III. *Altra operazione integrante è quella di scavare un canale a mano* [...] *cominciando sotto la confluenza del Bacchiglione e della Brentella e mettendo capo al Canal di Pontelongo a Bovolenta.* [...]

IV. *Per fine richiedasi che l'Alveo di Pontelongo da Bovolenta in giù s'allarghi e si riduca alla misura circa del nuovo alveo poc'anzi proposto* [...].

E questo in generale sia detto quanto al primo articolo del piano interno dell'unione in un sol alveo tutte le acque della Brenta.

Passando pertanto al secondo che riguarda i canali di derivazione degnino VV. EE. farsi presente che l'alveo nuovo da escavare seguendo il suo cammino che deve fare dalla confluenza attuale del Bacchiglione, e dalla Brentella in giù, taglia il Canal di Navigazione per la Battaglia nei dintorni di Mandriola.

Quindi sulla sinistra penso di erigere la fabbrica per la derivazione dell'acqua per Padova, cioè per il Canal Naviglio di Venezia, e sulla destra l'altra fabbrica per la derivazione dell'acqua per il Canal Naviglio della Battaglia. [...] *La fabbrica del Naviglio di Venezia consiste in dodici chiaviche e controchiaviche* [...] *e in un sostegno laterale a doppia porta, a conca intermedia per la Navigazione di esse.* [...] *Il Canale dunque AC* [the Tronco Maestro] *riceve e acque dalle chiaviche proposte e preso il suo cammino entra in Padova, donde fatte le funzioni principali di Canale per gli Edificj e di Canal Naviglio per mezzo delle diramazioni che succedono al Ponte di Legno esce poi con tutte le acque unite per le due sboccature dei Carmini e delle Porte Contarine e mette capo nel Piovego. E perchè non se ne abbia a dissentire alcuna minima quantità ne' dal Canal di navigazione di Padova, ne' dall'altro a Sinistra che va a Ponte Molino, ne' dal Tronco comune dopo la loro confluenza saranno intestate le cosiddette gradelle di Porciglia e tutte le altre erogazioni minori che non trovassero a restituire l'acqua ne' Canali Maestri.* [...] *A questo oggetto* [Gradelle di San Massimo] *si possono legare insieme i riguardi di questo canale* [Ponte lungo] *con quelli dei tre condotti, Alicorno, Olmo e Torreselle, che serpeggiano per la città di Padova e prestan diversi Uffizj, in maniera che fatte che abbiano queste loro funzioni nella città, cadano unitamente a scaricarsi a S. Massimo, e riescano per la Gradella* [...] *e formino poi il Canal di Roncajette cioè corpo a parte, distinto e separato dal Canale Naviglio di Padova* [...].

[...]

Questo è in generale l'umilissimo parer mio intorno ad una sistematica regolazione delle acque della Brenta. I vantaggi che ne risultano sono questi:

I. *Essendo ridotte le acque tutte in un sol alveo maestro si manterrà scavato il fondo* [...].

II. *Due saranno gli argini da custodire* [...].

III. *Riesce per tal modo di molto allontanata la Brenta dalla Laguna* [...] *e dalla città di Padova, purtroppo molestata frequentemente dalle inondazioni di un fiume intero che vi entra e la circonda* [...].

IV. *La navigazione si rimette in ottimo sistema sempre operosa, ne' mai* [...] *interrotta.*

V. *Lungo il Canal Naviglio da Padova al Dolo non sono più necessarie, ne' così alte, ne' così larghe le arginature* [...].

VI. *Così si apre pure campo libero* [...] *di far costruire la strada reale da terra* [...].

VII. *E ben si comprende che si salvano ad un tempo con la Navigazione regolata* [...] *la Battaglia, e tutte quelle altre* [...] *campagne minacciate continuamente da un ramo di fiume* [...]. *Non essendo ad altro diretto, quel ramo, che a pura navigazione, il principio mio* [...] *di non confondere Fiumi e Canali Navigli, e di far sempre che Canal Naviglio tragga dal Fiume per bocche regolari* [...].

VIII. *Si apre a Padova* [...] *e a buona parte del Vicentino una libera nuova comunicazione per la Brenta al mare* [...].

IX. [...] *l'acqua libera della Brenta potrà scorrere per l'alveo dritto allungato e profondo della Brentella* [...] *e non sarà costretta la Brenta a vincolarsi per entrare forzatamente* [...] *nell'alveo della Brenta Vecchia* [...].

X. *Per ultimo cessano tante annue spese, così in argini, come in ripari, a palificare in tutti i canali della Brenta Vecchia, del Piovego, del Canale del Dolo, del Brentone, del Canal della Battaglia* [...]. *Tutto si restringe a custodire, come si è detto, due sole arginature.*

Verona, 29 Marzo 1777 *A. M. Lorgna Col.*

ASPd, Acque, b. 53, f. II, Piano generale per la Regolazione del fiume Brenta, Relazione Colonnello Lorgna, 1777.

14.

1782, 16 November, Padova

Plea for the excavation of the «*Fiumicello, che dalla Porta Saracinesca entra nella città di Padova, e scorrendo per la Contrada del Vanzo si unisce e scarica nel Canale inferiore delle Torreselle*».

ASPd, Acque, b. 25, f. IX, Canale detto fiumicello in contrada S. Maria in Vanzo.

15.

1784 (?), undated, Verona

Colonel Antonio Maria Lorgna informs the Magistrato alle Acque of the terminations necessary to implement the plan to regulate the Brenta River proposed in theoretical form to the Magistrato in 1777 (cf. doc. 13).

Piano di governo e custodia della Brenta e sue diramazioni proposto da Anton Mario Lorgna, Colonnello d'Ingegneri al servigio della Serenissima Repubblica di Venezia e Cavaliere dei Santi Maurizio e Lazzaro.

Mi do l'onore di rassegnare all' EE.VV. Il Piano di Governo e Custodia della Brenta [...] *che, come le mie deboli forze m'hanno permesso di fare, ho finalmente compilato. Dopo avere* [...] *visitato ogni Canale a parte a parte personalmente e fatte da uoini abili praticare le convenevoli Perticazioni;* [...] *e dopo di avere meditato sul modo più semplice, più economico, e più sicuro di mantenere le acque di questo fiume, in ubbidienza, umilio al pregiatissimo Loro giudizio questo scritto devotissimo, in cui non una parte, ma tutti i Canali a parte a parte riduco a regolamento e governo* [...].

[...]

Del Governo, e custodia della Brenta in generale. Introduzione.

Poiché non è la Brenta nell'attuale sua condizione un Fiume solitario, [...] *ma un corpo d'acqua diramato in varj Canali, e a luogo a luogo da altre acque straniere ingrossato* [...] *è necessario, che al par di lui il governo pure si dirami e suddivida in varj particolari dipartimenti. E perchè la Custodia da riporsi in mano di abili soggetti sia ugualmente distribuita, e confidata, sembra convenevole, che tutto il sistema sia in tre Riparti principali diviso, assegnando a ciascuno un centro, donde un Ignegnere presidea a tutti i Canali del suo riparto e possa percorrerli nelle occorrenze non difficilmente. Pertanto secondo questo divisamento saranno i Posti centrali, cioè il Dolo, Limena, e Bovolenta, in ciascuno de' quali farà stazione un Ingegnere. A questi tre presiederà un Ingegnere in qualità di Direttore di tutti i Riparti, che dimorerà nella città di Padova.*

[...]

Nel primo riparto del Dolo sarà compreso il Brentone e tutto il Tronco Maestro della Brenta [...] *e di sotto al Dolo l'intero canale di irrigazione* [...] *e il Canal Novissimo.*

Nel secondo riparto di Limena si comprendono la Brenta solitaria superiormente sino a Curtarolo e inferiormente la Brenta vecchia sino a Stra [...], *la Brentella col Bacchiglione da Tencarola in giù sino a Padova, e il Canal della Battaglia.*

Nel terzo riparto saranno compresi da Bovolenta in giù il canale di Ponte Longo sino alla confluenza col Brentone e superiormente il Canal di Roncajette, e il Canale della Cagnola co' suoi influenti sino alla Battaglia.

Primo Riparto.

Il Brentone [...] *dovrà dividersi in otto guardie, cioè quattro sulla destra e quattro sulla sinistra* [...]. *Ogni guardia avrà un Cavarzerano, e due Arzerani a lui soggetti* [...]. *Quanto poi al Tronco Maestro sarà diviso in due Guardie sulla destra e due sulla sinistra* [...] *e ciascuna assegnata in custodia a un Cavarzerano e due Arzerani. E quanto finalmente al Canale di Navigazione* [...] *ed al Canal Novissimo* [...] *ciascuno di essi*

sarà dato in Custodia ad un Cavarzerano e a due Arzerani solamente i quali avranno cura sia della destra che della sinistra parte dei Canali; tanto essendo bastevole un permanente governo di quelle acque regolate.

Secondo riparto

Il primo tronco di questo riparto da Curtarolo a Limina [...] *dovrà dunque dividersi in due Guardie, una sulla destra e una sulla sinistra, ciascuna delle quali sarà presa in custodia da un Cavarzerano e due Arzerani. E qui dividendosi in due la Brenta, il Canale detto della Brenta Vecchia da Limina a Strà* [...], *sarà diviso in quattro guardie, cioè due per parte* [...] *e ciascuna in custodia di un Cavazerano e di due Arzerani. Similmente tornando all'altro Ramo della Brentella* [...] *da Limena all'unione col Bacchiglione, sarà egli diviso in due guardie, una per parte, e sarà affidata ciascuna ad un Cavarzerano, e a due Arzerani. Pel Tronco de Bacchiglione da Tencarola sino alla confluenza con la Brentella e di là a Padova* [...] *basterà in pieno un solo Cavarzerano e due Arzerani. E quanto finalmente al Canale della Battaglia* [...] *dal Bassanello alla Battaglia sarà diviso in due Guardie, una per parte, ciascuna affidata ad un Cavarzerano e a due Arzerani.*

Terzo riparto

Il canale di Bovolenta sino alla confluenza col Brentone [...] *sarà diviso in sei guardie, tre per parte* [...], *e ciascuna sotto la Custodia di un Cavarzerano e di due Arzerani. Ed il nuovo Canale di Roncajette da Bovolenta alle Gradelle di San Masismo* [...], *sarà diviso in due sole Guardie, una per parte, delle quali ciascuna sarà presa in cura da un Cavarzerano e due Arzerani. Finalmente l'ultimo canale di questo riparto della Cagnola* [...] *sarà diviso in due guardie, una per parte, affidando ciascuna ad un Cavarzerano e a due Arzerani.*

Regole generali di Buon Governo per la Brenta.

Capitolo primo.

Fatta la ripartizione di tutti gli alvei maestri e delle diramazioni della Brenta [...], *il luogo è questo di preparare la regola per il buon governo di tutte queste acque* [...].

I.

Non essendo costume di queste acque [...] *l'intaccare gli arginamenti con potentissime corrosioni* [...], *ma disposte piuttosto a far prestamente escrescenza e salire in piena altissima, così il primo oggetto da aversi* [...] *in veduta nel buon governo di loro è il preservarsi da traboccamenti con altezza convenevole di sponde di ogni parte. E però sarà fatto piantare fuor d'acqua un Palo squadrato* [...]. *Su questi pali, o capi-saldi saranno segnate le massime piene* [...], *non essendo possibile di proporzionare le altezze da darsi agli argini, se non sia nota in ogni parte del Fiume la cadente delle Piene.* [...] *Senza questa preliminare provvidenza non deve mai promettersi un Ingegnere di rialzare le arginature col rischio di far più del bisogno, o meno, ch'è pericoloso. Ciò presupposto, dovrà essere pensiero primo e serio più di tutti in questo nuovo governo quello di preparare un sistema di arginature ne' diversi canali di convenienti dimensioni, perché si mantengano per ogni verso le acque nella tanto necessaria obbedienza.*

II.

Ecco pertanto quello che dovrà seguirsi ed effettuarsi appoco appoco per la massima dagli ingegneri in questa parte. E quanto riguarda la larghezza degli argini in sommità [...].

[...]

E quanto all'altezza, sia massima ferma e statutaria [...]. *Ed è appunto a questo oggetto che nell'articolo precedente si è stabilito che su capi-saldi di legno disposti di miglio in miglio sia segnata la massima piena prima di ogni altra cosa.*

III.

Non sarà mai permesso che restino nel vivo degli argini incorporati alberi, muri e simili impedimenti, dovendo la coltura solamente degli alberi essere conceduta al piede dell'argine verso il fiume, e su la scarpa alla campagna [...].

[...] *Sarà però nel medesimo tempo giovevole, che a piè delle scarpe al fiume, e in acqua siano coltivati salici, e tenuti bassi di ramificazione co' frequenti tagli* [...].

IV.

Provveduto pertanto al corpo e alla sodezza delle arginature, convien pensare alle difese della fronte [...] *dagli intacchi e dalle corrosioni.*

[...]

Il lavoro [the Installation of cages made with willow branches filled with earth] *è di modestissima spesa e durevole assai per quello che il legno verde non marcisce facilmente in acqua e poi vi si introduce il Lezzo* [holm oak] *che rincalza l'opera e la perpetua.*

[...]

V.

[...] *Esprimamente si renderà necessario lo stabilimento di convenevoli magazzini ove possa riserbarsi ogni sorta di Attreccj come Badili, Zappe, Carriole, Cordame, Stoppe, Fanali, Stuoie, Sacchi per un immediato bisogno e non inutili anche pe' tempo di calma.*

[...]

Sarà cura dell'Ingegnere Direttore di preparare a tempo e rassegnare all'Eccellentissimo Magistrato un piccolo ruolo di Uomini da disporsi per le guardie perché non resti né di notte, né di giorno senza custodia il fiume.

[...]

VI.

E quanto ai Magazzini, essendo essi destinati precisamente per essere depositi singolarmente pe' bisogni massimi delle Piene e istantanei, la massima parte degli effetti depositati dovrà rispettarsi fra l'Anno e riserbarsi nelle occorrenze straordinarie.

Capitolo II

Doveri degli Arzerani

Le incombenze degli Arzerani nell'annuo ordinario Governo del Fiume debbono essere operative e manuali, avere per iscopo il riparare sul fatto, e da se tutti li minori sconcerti nelle Argniature e tenere in acconcio la parte assegnata loro rispettivamente nelle differenti guardie con tutta la prontezza e diligenza necessaria.

[...]

V.

Nei tempi dell'Acque in colmo dovranno essere gli Arzerani le guardie più vigilanti e più attente di tutti, dovendo scorrere le linee rispettive, riconoscere ogni minimo sconcerto sul nascere, avvertendo il Cavarzerano, e accorrendo immeditamante al riparo.

Capitolo III

Doveri dei Cavarzerani

Essendo l'ufficio del cavarzerano uno d'più importanti nel Governo de' fiumi, siccome quegli cui l'immediata cura e degli arginamenti e delle difese sta appoggiata, la persona destinata ad un tale esercizio deve essere d'intelligenza e pratica moltissimo e di moltissima attività.

[...]

VII.

[...] *Tutto in fine porrà in opera la sua abilità, perché nel tempo in cui il Fiume persisterà sopra il segno della Guardia straordinaria, nessuna parte della sua linea rimanga senza presidio, e convenevole custodia a scansamento di rotta, e sia tolto ogni pericolo di sormontazione.*

Capitolo IV

Ispezioni dell'Ingegner d'un riparto

La stazione degli ingegneri agli argini sarà in situazione a portata del rispettivo riparto.

[...]

VIII.

[...]

Manterrà tutto e tutte le persone nella dovuta obbedienza, accorrerà e provvederà ad ogni bisogno; si terrà in continuo movimento riconoscendo e visitando le situazioni più gelose, animando i subordinati ad una pari diligenza, e distribuendo per turno le guardie sicchè non manchi ne' di giorno ne' di notte una permanente custodia in tutto il suo riparto.

[...]

Capitolo V

Ispezioni dell'Ingegnere Direttore

All'ingegnere Direttore sta in principalità appoggiato il Governo della Brenta e la cura e responsabilità decisa di tutte le operazioni e di tutti i consigli pe'l buon sistema del Fiume. Oltre all'intelligenza, che in esso lui richiedesi nella scienza dell'Acque, la pratica pure è necessaria ad un tale soggettoed un'esperienza fatta e provata su Fiumi [...].

Capitolo VI

Della cassa particolare e sua amministrazione.

Siccome le operazioni su Fiumi vogliono esser fatte all'occasione prontamente e talvolta istantaneamente e non può questo ottenersi senza un pronto ed istantaneo Denaro, così è indispensabile che dall'Ecc.mo Mag. to all'Acque venga stabilito nella Città di padova un Deposito [...]*; il qual Deposito venga di mano in mano alimentato dalla Cassa destinata al governo annuo ordinario e straordinario della Brenta esistente in Venezia presso l'Ecc.mo Mag.to all'Acque.*

[...]

Capitolo VII

Delle visite statutarie.

Due debbono essere le visite annuali e necessarie da farsi per tutti i riparti. La prima dovrà praticarsi nel mese di novembre, la seconda nel mese di aprile, quella per riconoscere i lavori da farsi, questa per riconoscerli e riscontrarli dopo fatti. La visita sarà fatta di riparto in riparto dall'Ingegnere Direttore e dall'Ingegnere naturale del Riparto.

[...].

ASPd, Acque, b. 53, f. II, Piano generale per la Regolazione del fiume Brenta, Terminazioni della conferenza del magistrato alle acque ed aggiunti ai fiumi, 1784.

16.

1791, 27 January, Paris

The president and the secretary of the Assemblée Nationale sign off the debate on the project, already approved by the King, for a new canal linking Pontoise and Paris, which had evidently been subject to considerable discussion: «*Il suffit, pour se convaincre de l'importance et de l'utilité de la navigation intérieure, de considérer les avantages qui ont résulté de l'établissement des canaux en Europe*». According to the Assemblée, the old canal did not offer a safe route, whereas the new one, designed and built at his own expense by Jean-Pierre Brullée, would enable boats to reach the Bassin de l'Arsenal from Pontoise in just a day. The route, open to travel in exchange for payment of a toll, closely followed that of the future Parisian canal system. Taking water from the Marne – and passing through La Villette – the new canal would split into two branches, one flowing through the faubourgs Saint-Martin and du Temple, to the Bastille, the Arsenal and the Seine, and the other, flowing through Saint-Denis and Montmorency, to Pontoise and, from there, via another canal designed by Brullée, to Dieppe. The new riviera would also make it possible to build several ports within the city, useful for bypassing the marshes in the Temple area. Above all, the creation of a new canal would allow Paris to compete with London in the commercial sphere, gathering merchants from all over Europe along its course and in its basin, envisaging commercial links with the ocean and overseas:

Le Canal de M. Brullée exécuté, Paris deviendra l'emule de Londres commerçante; il existera des relations toujours actives entre les habitants de la Capitale et des differens départemens avec les nations étrangères. Dans un vaste bassin, sous les murs de Paris, seront rassemblées les marchandises nationales et étrangères, celles de la Normandie arriveront par la Basse-Seine; celles de la Flandre et de la Picardie par l'Oise; celles de la Lorraine et de la Champagne par la Marne; celles de la Bretagne, de l'Anjou, de la Tourraine, de l'orléanois, et même de la Bourgogne, par la haute-Seine, dans laquelle se jettent l'Yonne, les canaux d'Orléans et de Briare, qui par leur communication avec la Loire, formeront pour la ville de Paris une jonction avec l'Océan: les productions d'outre-mer y affluieront aussi par le port de Dieppe.

ANFr, F/14 Travaux publics, c.684/B, Seine et Canal de l'Ourcq, Canal de M. Brullée.

17.

1797, undated, no location

In 1797, Francesco Bacin, a city surveyor, drew up and signed a census of all the mills in Padua (starting with those in Ponte Corvo and Ponte Molino) and its province, indicating their owners.

ASPd, Acque, b. 40, Mulini esterni e interni alla città, 14...-1797.

18.

1797, Termidoro 15 (2 August), Padua

In the letter, the General Military Department informs the Water Department of the request by the Gastaldo dei Barcarioli of Padua to close the bays of buildings on the navigable canal between Padua and Este, to facilitate the increasingly frequent transport of French patients to hospitals in the south of the Region. The Military Department referred the request to the Water Department.

Il giorno 15 Termidoro Anno 5 della Repubblica Francese e I della Libertà Italiana.

Il Dipartimento Militar Generale, V. del Governo Centrale.

Al Dipartimento Acque, Fiumi

Presentatosi al nostro Dipartimento il Cittadino Guerino Scarfi attual Gastaldo de Barcarioli di Padova ci fece vedere una quantità di ordini riguardanti il trasporto degli ammalati francesi, che riportano alla

Battaglia, ad Este, ed altri Ospitali da quella parte esistenti. Per poter adempiere intieramente a tutto dimanda questi che siano chiuse le bove degli edifizi che sono nel Canale navigabile da Padova ad Este. Quanto ci rassembra necessaria questa ricerca, altrettanto crediamo conveniente il porvi sotto i vostri [riflepi]li bisogni delli edifizi. Sar perciò cura e maturità vostra il combinare ad un tempo a l'uno e l'altro de sopracennati oggetti, come più diffusamente saprà dirvi si sopradetto Scarfi ricorrente per quell'affare. Vi diciamo di cuore Salute e fraternità.

Antonio Clechini

ASPd, Acque, b. 1, Lettere al dipartimento sui fiumi, acque etc del Padovano, Polesine, di Rovigo ed Adria in materia di Acque e provenienti dalle seguenti Municipalità della giurisdizione: Rovigo, Badia, Boara, Castagnaro, Lendinara, Adria, Mirano, Padova, Conselve, Teolo, 1797-1798.

19.

1797, Termidoro 27 (14 August), Padua

Following the request to close the bays of the buildings, the Central Government of Padua ordered the members of the Department of Rivers and Embankments to close all the buildings in Mezzavia, Battaglia, Chivella, Bagnarolo and Este from midnight until sunrise, until further notice, to allow the transport of French patients.

ASPd, Acque, b. 1, Lettere al dipartimento sui fiumi, acque etc del Padovano, Polesine, di Rovigo ed Adria in materia di Acque e provenienti dalle seguenti Municipalità della giurisdizione: Rovigo, Badia, Boara, Castagnaro, Lendinara, Adria, Mirano, Padova, Conselve, Teolo, 1797-1798, lettera 999.

20.

1798, Brumaio 24 (14 November), Padua

In the letter, the Extraordinary Economic-Military Commission asks the Water Department to give orders for more water to be brought into the Bassanello, which was a fundamental route for transporting oats to the troops in the city.

Padova il giorno 24 brumaio., 14 novembre anno VI della Repubblica Francese, una e indivisibile.

La Commissione straordinaria economico-militare

al Dipartimento Seconda

Siete invitati a dare li vostri ordini, perché sia data l'acque necessaria al Canale del Bassanello, onde possa arrivar prontamente in Città l'avena occorrente per uso delle truppe; non potendo le barche progredire per la mancanza dell'acqua medesima.

Salute e Fraternità,

Cristofori Secreti

ASPd, Acque, b. 1, Lettere al dipartimento sui fiumi, acque etc del Padovano, Polesine, di Rovigo ed Adria in materia di Acque e provenienti dalle seguenti Municipalità della giurisdizione: Rovigo, Badia, Boara, Castagnaro, Lendinara, Adria, Mirano, Padova, Conselve, Teolo, 1797-1798.

21.

1798, 26 November, Venice

The edict officially outlawed all unauthorised diversions of water for «*usi privati, se non con la base di legale Investitura, sia per irrigazione di Terreni, Risaje, o Maceratoi, o per qualunque sorta di Edifizio*».

ASVe, Biblioteca legislativa, Editti Regj Imperiali, b. 10

22.

1798, 11 December, Padua

In order to prevent further damage to the beds and embankments of Padua's canals, the following Members of the Government – Contarini, Erizzo, Grimani and Querini – request «*che d'ora innanzi non vi sia chi faccia discendere, ed ascendere cavalli nel fiume, se non per le Beverade combinate all'oggetto*», «*che le Lavandaje non smuova nella più minima parte i Sassi posti a Scogliera* [...], *ne' alterino la forma delle Arginature*» and «*che gli Artefici Tagliapietra disposti lungo le sponde del Fiume non abbiano a gettare le scaglie risultanti dai Lavori loro nello stesso, cagionando con ciò degl' imbonimenti, ne' a formarsi una più comoda Piazza per la disposizione del loro Lavoro con restringimento del fiume*».

ASVe, Biblioteca legislativa, Editti Regj Imperiali, b.10.

23.

18**, undated, no location

The engineer Gaspard de Prony published a report on the research carried out on the Adriatic area occupied by the delta of the river Po and the changes that this area had undergone over the centuries, particularly in relation to the shifting of the banks: «*la partie due rivage de l'Adriatique comprise entre les extrémités meridionales des lagunes de Comachio et des lagunes de Venise, a subi, depuis les temps antiques, des changements considerables attestés par les temoignages des auteurs* [...]».

Prony immediately points out that the town of Adria was formerly located along the water's edge, using this information as a reference point in the study of the shifts: «*On est cependant assuré que la ville de Hatria, actuellement Adria, était autrefois sur les bordes de la mer, et voilà un point fixe et connu du rivage primitif* [...]».

Starting from Adria, the engineer describes in great detail the various water structures along the way: the course of the Adige, the alluvial ditches to the west, the beginning of the Venice lagoon and the area of the ancient Roman city of Altino.

Prony states that the earliest information he found on the shifting of the Adriatic shores around the Po dates back to the 12th century: «*Les renseignements que j'ai recueillis sur le glissement de la cote de l'Adriatique au bouches du Po, commencent au 12e siècle* [...]», subsequently adding a precise description of the layout of the Po (divided into two branches, the Po of Volano and the Po of Primaro) and its tributaries in ancient times. Prony describes the layout of the ancient coastline, reporting all the correspondences between the names of ancient and current places. In his work, Prony pays particular attention not only to the study of the Venetian lagoons, but also to that of the area of Goro and Porto Viro, which bordered the Po Delta to the south and north.

BIB.E.N.P.C., Fonds Prony, c. Ms 1095, Déplacement de la partie du rivage de l'Adriatique occupée par les bouches du Pô (extrait des recherches de M. de Prony sur le système hydraulique de l'Italie), 18**.

24.

18**, undated, San Benedetto Po

Jacobin patriot Ignatius Bonafous submitted a project for the connection between the Mediterranean and Adriatic Seas to Bonaparte.

The plan called for the digging of a canal that would connect the confluence of the Stura and the Tanaro with the Po; coordinated with the construction of a short road that would allow travel to Savona from Alba, the project would, according to Bonafous, ensure a quick and direct connection between the

Mediterranean and the Adriatic and would bring countless agricultural and commercial benefits to the most isolated areas of Piedmont:

«[...] *ce canal, qui doit commencer à la réunion de la Stura et du Tanaro pour se verser dans le Po, offre des ressources immenses à l'Agriculture et au Commerce des deux Départements du Tanaro et de Marengo; plus une route de dix lieuses seulement,carrossable en toute saisons d'Albe vers Savone, vous donnerait la communication entre la Méditerranée et l'Adriatique* [...]».

This project was later mentioned as being in progress in the *Rapport et projets sur les Ponts et Chaussées (ans XII et XIII)* of 1806 (cf. doc. n.32).

BIB.E.N.P.C., Fonds Prony, c. Ms 1432, Rapport à son Altesse le vice-roi d'Italie sur les causes des inondations du Po à Parme et sur les moyens de rendre les crues de ce fleuve moins dangereuses. Projet de Canal, 1801.

25.

1804, undated, Paris

The hydraulic engineer and geographer Marcel Prault-Saint Germain presented Emperor Bonaparte with a project for the creation of a large navigable canal between the Rhine and the Seine, the *Navigation Bonaparte*. The canal would be the only commercial navigation route in Europe between the German and French territories: «*la seule navigation naturelle et commerciale qui existerait en Europe, et joindrait le Rhin à la Seine jusqu'a Paris*». Starting from Paris and flowing through Strasbourg, the canal would connect, on the one hand, with the northern canal as far as Le Havre and Dieppe and, on the other hand, would make it possible to reach the Danube, the Elbe and the Oder and from there, according to the author, all the other seas bordering the territories of the Empire, bringing huge benefits to the navigation of the various countries, due to its great extension and ramification:

La Navigation naturelle et commerciale du Rhin à la Seine, depuis Offendorff et Strasbourg sur le Rhin, jusqu'à Havre et Dieppe sur l'Ocean britannique, d'une part, et du Rhin joignant le Danube, l'Elbe et l'Oder communiquant par ses jonctions à presque toutes les mers, d'autre part, tient essentiellement par ses jonctions à presque toutes les mers, d'autre part, tient essentiellement au grand commerce, à la marine, aux colonies, et doit être envisagé sous tous ses points de vue capitaux (p. 2).

The Navigation project would make it possible to create a single large global navigation system; it would work alongside the already existing navigation of canals, tributaries, streams, lakes and ponds, upgrading and increasing their connections and thereby allowing greater and simpler navigation, improved exchange of goods, and more travel:

Les mers ne donnent pas seuls la Navigatio,; les fleuves, les rivières, les ruisseaux, les lacs et étangs en ont une qui leur est naturelle et qui leur devient propre par le travail, en approfondissant et étendant leur lit dans des endroits, en les resserrant dans d'autres, enfin, en les joignant les uns aux autres, pour établir une communication successive des extrémités au centre (p. 2) [...]. *Des rivières, ruisseaux et étangs à rendre navigables en tout temps; de petits canaux de jonctions d'iceaux pour former une grande navigation: tel est le résumé de cette entreprise importante, qui ne peut être que la source assurée du bonheur public, par les communications promptes, faciles, sures et économiques de toutes espèces de marchandises, productions et denrées de première nécessité* [...] (p. 3).

One of the models for such a grand work was represented by the great engineering projects of the Greeks and Romans: «*les Grecs et les Romains qui projétèrent un canal à travers l'isthme de Corinthe, qui joint la Morée à l'Achaie, afin de passer ainsi de la mer Yonienne dans l'Achipel* [...]».

The author points out that the line of navigation he envisaged would be accessible not only to standard-sized vessels, but also to merchant ships – «*Cette Navigation, par ses proportions, coupes et dimensions*

de largeur et de profondeur [...] *serait praticable en tout temps, non seulement pour des Paquebots, Coches, Galiotes, Barques, grands Bateaux de transort et tous aures, mais encore pour des Navires marchands* [...]» (p. 6) –, and that the link between the Seine and the Rhine would cross the departments of Bas-Rhin, Meurthe, Meuse, Marne, Aisne, Seine-et-Marne, part of Seine-et-Oise, Seine, and the tributaries of the Zorn, Bièvre, Sarre, Seille, Meurthe, Moselle, Meuse, Ornain, Marne and, of course, the Seine:

Cette Navigation [...] *traverserait les départements du bas-Rhin, de la Meurthe, de la Meuse, de la Marne, de l'Aisne,de Seine-et-Marne, partie de celui de Seine-et-Oise, et de celui de la Seine, par les rivières de Zorn, de Bièvre, de Sarre, de Seille, de Meurthe, de Moselle, de Meuse, d'Ornain, de Marne et de Seine jusqu'à Paris* (p. 7).

The report also envisages the construction of a port of arrival for the *Navigation Bonaparte* in Paris, marking out an area, located between Bastille and the island of Louviers, as the capital's new commercial district:

Comme il est absolument indispensable qu'il y ait dans Paris un port assuré, l'auteur de ce projet propose de le faire construire dans les emplacements de la Bastille, qui avec ceux de l'Arsenal, de la Visitation, des Célestins, et partie des Chantiers et Marais de la rue Contrescarpe, Faubourg Saint-Antoine, formerait un Port qui par sa grandeur et sa situation naturelle, servirait de gare à tous les bâtiments de navigation [...] (p. 9).

Public fountains and a guardhouse topped with a sculpture of a chariot of plenty pulled by the four bronze horses of St Mark would be installed in the structure around the port: «[...] *et sur le port en face du boulevard, il y aurait un grand socle de marbre servant de corps-de-garde, sur lequel serait placé un char d'abondance en bronze doré, attelé des quatre chevaux que Bonaparte a fait transporter de Venise* [...]» (p. 10).

The canal would connect Paris to the Rhine and, from there, to the Danube. Thanks to these two junctions, the project proposed by Prault de Saint Germain would ideally connect the capital of the Empire with almost all the conquered territories, allowing outlets in the North Sea, the Baltic Sea and the Black Sea. More specifically, according to the author, by travelling along the Danube, through ancient Presburg, vessels would have access to a small tributary and, thanks to the opening of a new 10-league canal crossed by the Drava and Sava, be able to reach the Adriatic Sea and the Gulf of Venice. Re-entering the mainland and exploiting the east-west crossing of the northern part of the Italian peninsula, they would then be able to sail to the Mediterranean:

[...] *revenant au Danube, et prenant sur la droite de Presbourg, l'on prend une rivière qui conduit à un intervalle de 10 lieus à ouvrir, lequel est traversé par les rivières de Drave et de Save, pour gagner la mer Adriatique ou golphe de Venise, qui communique à la Méditerranée* [...] (p. 24).

ADPa, Travaux publics, Affaires génerales, Grande voirie, Service hydraulique, Navigation, Canaux, Ponts, 1756-1938, DS5/1, Navigation Bonaparte.

26.

1805, Prairial 20 (8 June), Ferrara

Rolland and Bauger, French engineers in the service of Bonaparte, agreed on the importance of creating a new port along the Adriatic coast and carried out an inspection in the area of Magnavacca [now Porto Garibaldi, Ferrara] together with the engineers Stratico and Brandolini, reaching agreement on the construction of a new port complex: «*avoir satisfaction de voir M. et M. les ingénieurs italiens partager notre opinion sur l'emplacement d'un port*».

ANFr, F/14 Travaux publics, c.1032/1, Routes, ponts, navigation, Départements étrangers.

27.

1805, Thermidor 9 (27 July), Milan

The engineer Gaspard de Prony announces to the Minister of the Interior of the Kingdom of Italy his return from a 51-day mission to inspect the water network in the lower part of the Kingdom of Italy, taking the route through Pavia, Mantua, Comacchio, Cavarzere, Ferrara, Bologna, Modena, Parma, Piacenza and Milan. Prony noticed the close links between the water system of the Venetian and lagoon territory and that of the lower territories and rivers: «*tout le systeme hydraulique des états de Venise est liè a celui de la basse Italie* [Royaume d'Italie] *par les communications qui existent entre l'un et l'autre* [...]». Prony also reports on a viceregal project to set up a corps of Ponts et Chaussées in the Kingdom of Italy: «*Le Viceroi, que j'ai eu l'honneur de voir ce matin* [...] *m'a engagé en lire avec M. Paradisi le projet d'organisation d'un corps des Ponts et Chaussées à etablir dans le Royaume d'Italie* [...]».

ANFr, F/14 Travaux publics, c.1032/1, Routes, ponts, navigation, Departements étrangers

28.

1805, Thermidor 10 (28 July), Milan

In the second report to the Minister of the Interior on the mission to Italy (cf. doc. 27), engineer Prony says he is most interested in Venice and the cities around it, born and developed with a view to organising their major and minor water networks: «*On imagine combien le spectacle d'un pays et d'une ville qui n'existent que pour l'hydraulique doit avoir d'intérêt pour un ingénieur particulièrement adonné a cette science depuis 30 ans* [...]».

ANFr, F/14 Travaux publics, c.1032/1, Routes, ponts, navigation, Départements étrangers

29.

1805, Fructidor 14 (1 September), Milan

In his letter to the Minister of the Interior, Gaspard de Prony speaks of his second stay in Venice, during which he gathered information both on the Lagoon and on the rivers flowing through the cities of the "Venetian states". He focuses particularly on the work carried out years before on the course of the Brenta: «*J'ai profité de mon second voyage a Venise pour augmenter la collection des livres et mémoires que j'avais déjà formée, et je me suis procuré, entr'autres, les meilleurs ouvrages publiés sur les travaux hydrauliques de la Brenta*».

ANFr, F/14 Travaux publics, c.1032/1, Routes, ponts, navigation, Départements étrangers.

30.

1805, 31 December, Padua

With this proclamation, Prince Eugene de Beaurnhais publicly announces the annexation of Venice and the Venetian States to the Kingdom of Italy following the Peace of Presburg.

Proclamation

Peuple du Royaume d'Italie, et des états de Venise !

Le 27. Décembre à cinq heures du matin la Paix a été signée à Presbourg, par M. de Talleyrand, Ministre des Relations extérieures, de S.M. L'EMPEREUR DE FRANCE & ROI D'ITALIE, & M. M. le Prince de Liechtenstein & le baron de Giulay, Porteur des pleins pouvoirs de S. M. l'EMPEREUR D'ALLEMAGNE.

Le Traité qui a été signé à Presbourg, unit au Royaume d'Italie la Ville de Venise & tous les Etats Vénitiens.

Peuples du Royaume d'Italie; votre Roi à t-il rempli tous vos voeux, toutes vos espérances ?

Peuples des États Vénitiens; vour serez heureux, Votre Pays ne sera plus le Théâtre de la Guerre; vous n'envierez plus à vos voisins l'honneur d'être gouvernés par NAPOLEON.

Le grand Siècle de l'Italie va donc renaître ! Ainsi l'ont ordonné la Génie & la Vaillance.

Italiens, soyez fiers du grand Evénement que je proclame.

Votre patrie retrouvera la gloire antique, augmentée de toute l'illustration qui s'attache à l'instant de sa renaissance, & qui suivra jusque dans les derniers Siècles, le nom de son nouveau Fondateur.

Donné a notre Quartier Général de Padoue le 31 Décembre 1805.

LE PRINCE EUGENE.

ASVe, Biblioteca legislativa, Editti emanati dal Governo provvisorio del Padovano e suoi dipartimenti.

31.

1806, 4 January, Paris

The *Devis Générale du Canal de l'Ourcq*, compiled by Paul Girard, Chief Engineer of the Imperial Corps of Ponts et Chaussées, states that the purpose of the Ourcq diversion canal was to bring the waters of the Ourcq into a basin within the city, making it navigable. The waters were to be used for two purposes: to maintain a navigable canal that would extend from the basin to the Seine – «*1°. A entretenir un canal de navigation descendant de ce bassin dans la Seine au-dessous de l'Arsenal*» – and to supply new fountains and clean up the city, but more generally to decorate the city and make it healthier – «*2°. A alimenter dans l'interieur de Pars de nouvelles fontaines, et un certain nombre de réservoirs destinés au nettoiement des rues, des égouts, et, en general, à fournir de nouveaux moyens d'embellir cette capitale et d'en rendre le séjour plus salubre*». The engineer also informs us that Emperor Bonaparte had ordered a communication link to be opened between the upper part of the Canal de l'Ourcq and the Aisne outlet, to provide a direct outlet to the Canal de Saint-Quentin and the link with Belgium for the export of foodstuffs to supply Paris: «*une communication entre la partie supérieure du Canal de l'Ourcq et la rivière d'Aisne [..] afin que ce canal offrit un débouché plus direct à celui de Saint-Quentin et à ceux de la Belgique, pour l'exportation des denrées destinées à l'approvisionnement de Paris*». Girard conceived the project as consisting of three parts: the first was the construction of the Ourcq diversion and navigation canal from the Mareuil lock to the La Villette reservoir; the second comprised the distribution of water from the reservoir both for the supply of the Saint-Martin navigable canal and for the new fountains and *chateaux d'eau* in Paris; the third comprised the link of the Ourcq to the Aisne.

ANFr, F/14 Travaux publics, c.684/B, Seine et Canal de l'Ourcq, Devis generale de l'Ourcq, 1806.

32.

1806, 24 February, Paris

The *Rapport et projets sur les Ponts et Chaussées (ans XII et XIII)*, drawn up by the service of engineers of the same name, presents the technical details and the accounts of the works carried out from the foundation of the Empire until the date of publication. In addition to the general accounts, the publication divides the list of works into categories: roads, large bridges, river navigation, Paris riversides, canals under construction, canals in the planning phase and seaports.

The roads category includes improvements to roads that guaranteed a direct link between France and the Italian departments of the Empire, such as the road from Savona to Alessandria, the Mont Cenis road, the Montgenèvre road, the Simplon road, the road from Nice to Genoa and the rectification of the Mont Blanc pass (pp. 5-19).

The navigation section – which included work on the river courses and embankments as well as the planting of protective dunes – explains that the river basins involved were those of the Rhine, Rhône, Loire, Somme, Gironde and Po. With regard to Lyon, in addition to repairs to the Guillotière customs road, the wall along the river Serin and the construction of the imperial residence at Perrache, the catalogue mentions expenses for the restoration of the Tête d'Or dam, the reclamation of certain areas of the city and, most importantly, funds allocated to the new project for the reconstruction of the port of Givors.

On the navigation of the Po, the catalogue explains how there were several projects by French engineers, particularly Prony «*inspecteur général, qui a parcouru le Po en bateau depuis sa source jusqu'à son embouchure dans l'Adriatique, visitant les deux rives et la partie inférieure des affluents de droite et de gauche*», p. 30. The works to connect the Po to the Stura and the joining of this canal with the river Tanaro are mentioned. There is also mention of a project to allow the Emilian Reno to flow into the Po.

The document also contains a small section on a number of projects developed by the French engineers Prony and Sganzin, during their trips to Italy. These include the project for the construction of a new port on the Adriatic at Comacchio, which faded into the background after the annexation of Venice to the Kingdom of Italy: «*Il a été fait un projet d'un port sur l'Adriatique à Comachio; mais la réunion de Venise au royaume d'Italie rend ce travail d'une moindre importance qu'il n'était alors*», p 104.

BIB.E.N.P.C., Fonds Prony, c. 4°9903/C535, Rapport et projets sur les Ponts et Chaussées (ans XII et XIII).

33.

1806, 29 April, Saint-Cloud

The decree stated that «*le provincie di Venezia, Padova, Vicenza, Treviso, Udine, Belluno, compresovi i paesi di Feltre, di Cadore e d'Istria*» would form «*sette dipartimenti del Regno, i quali conservano la loro circoscrizione attuale*». Venezia became capital of the Department of Adriatic and Padua of the Department of the Brenta.

ASVe, Biblioteca legislativa, Bollettino delle Leggi del Regno d'Italia, b. 27, vol. 16, pp. 388-391, decreto n. 55.

34.

1806, 6 May, Saint-Cloud

Secretary of State Aldini, as Minister of the Interior of the Kingdom and signatory of Napoleon I, announced the birth in the Kingdom of Italy of the Corpo degl'Ingegneri d'acque e strade. The Corps was divided into Ingegneri generali, Ingegneri in capo, «*Ingegneri ordinarj di prima* e *di seconda classe*» e Aspiranti and its tasks were those of control and planning. The work of the Corps depended directly on the Magistrature Dipartimentali di Acque e Strade and Prefetture.

ASVe, Biblioteca legislativa, Bollettino delle Leggi del Regno d'Italia, b. 27, vol. 17, pp. 457-472, decreto n. 73.

35.

1806, 20 May, no location

By order of Eugène Napoleon, viceroy of the Kingdom, within the *Regolamento per la navigazione e per la custodia e conservazione di porti di mare*, it is stated that

la navigazione si considera sempre essere l'oggetto principale a cui servono i fiumi ed i canali navigabili. Tutti gli altri avvantaggi che possono ottenersi, deviandone le acque, a applicandole ad altri usi, si considerano sempre subordinatamente a quel primo fine.

ASVe, Biblioteca legislativa, Bollettino delle Leggi del Regno d'Italia, b. 27, vol. 17, pp. 529-537, decreto n. 81.

36.

1806, 25 July, Saint-Cloud

At the behest of Emperor Bonaparte, the Magistrato Centrale d'Acque in Venice was established and «*composto da individui tratti da' dipartimenti dell'Adriatico, dell'Adige, del Basso Po, della Brenta, del Bacchiglione e del Tagliamento*». The Magistrato was to intervene in cases of emergency as special authority dedicated to the Veneto territories. It was disbanded on 6 May 1808.

ASVe, Biblioteca legislativa, Bollettino delle Leggi del Regno d'Italia, b. 27, vol. 17, pp. 794-795, decreto n. 145.

37.

1806, 28 July, Saint-Cloud

Napoleon Bonaparte appointed a commission of the most renowned hydraulic engineers from the former Veneto States annexed to the Kingdom, whose job was to design and implement specific works – including the excavation of a new navigable canal between the Adige and the Canale d'Este and the rectification of the course of the Brenta – on the particular Veneto water network.

NAPOLEONE I,

Per la grazia di Dio e per le Costituzioni,

Imperatore de' Francesi e Re d'Italia,

Abbiamo decretato e decretiamo quanto segue:

Art. I. Sarà nominata una Commissione d'Idraulici i più rinomati, la quale, previo l'esame de'piani esistenti circa i lavori d'acque da farsi nei Paesi Veneti, e sentiti tutti i Dipartimenti interessati, ci presenterà un piano generale di lavori, che coll'interesse di Venezia vada a conciliare quello di Terra ferma.

II.La stessa Commissione ci presenterà pure i seguenti progetti:

Per l'escavazione del Canale e Porto di Malamocco;

Per l'asciugamento delle Valli Veronesi, Bionde, Zerpa e Porzil;

Per l'escavazione di un canale navigabile fra l'Adige e il canale d'Este, cominciando da Albaré;

Per la rettificazione del corso della Brenta;

Per i ripari alle inondazioni del Bacchiglione e del Retrone;

Pel riaprimento del Canale Bisatto;

Per il ristabilimento dell'acquedotto Pederobba, e pel riaprimento dell'emissario nel Sile.

III.La Commissione specificherà l'ordine del tempo in cui dovranno eseguirsi gl'indicati lavori, e l'importo presuntivo della spesa.

IV.Il Ministro dell'Interno del Nostro Regno d'Italia è incaricato della esecuzione del presente Decreto che sarà pubblicato ed inserito nel Bollettino delle Leggi.

Dato dal Nostro Palazzo di S. Cloud questo dì 28 luglio 1806.

NAPOLEONE

Per l'Imperatore e Re,

The Minister Secretary of State,

A. ALDINI.

ASVe, Biblioteca legislativa, Bollettino delle Leggi del Regno d'Italia, b. 27, vol. 17, pp. 806-807, decreto n. 157.

38.

1806, 13 August, Paris

Gaspard de Prony opens the log of his second trip to Italy, from 14 August 1806 to 12 January 1807.

Leaving Paris on 14 August and crossing the whole of France, Prony arrived in Milan on 9 September. From there, via Verona, the engineer reached Padua on 12 September and Venice on 13 September.

Prony spent a month in Venice before moving on to Friuli and then down through the Ferrarese area towards the south of the Kingdom.

During his stay in the lagoon city, the engineer, accompanied by General Miollis, visited the Arsenal, the area of the Lido and Malamocco inlets, the Fusina and Chioggia areas and the Brondolo outlet.

When sailing from Chioggia to Ferrara, between 13 and 16 November, Prony used locks to overcome the differences in level, studying their technique, pros and cons: «[...] *dans un terrain rempli qui communiquent avec le Canal pour des Chiaviche*».

BIB.E.N.P.C., Fonds Prony, c. Ms 1817/1, Journaux des missions en Italie, journal de mon second voyage d'Italie, 2ème mission depuis le 14 aout 1806, jusqu'au 12 janvier 1807, 1806-1807.

39.

1809, 18 November, Paris

Gaspard de Prony started writing the log of his third, and shortest, trip to Italy, which began on 18 November 1809. During this third mission, the engineer would mainly cover the north-east of the country. «*Parti de Paris à 8 heures du matin* [...]» (p. 227), the engineer reached Milan about a week later.

From 29 November to 10 December, Prony took the opportunity to visit Padua again and then, following the water link, Venice. In what was once the Most Serene Republic of Venice, the engineer focused once again on the maintenance of areas facing the sea, such as the Lido, Pellestrina and Malamocco.

On his return to the mainland, starting on 11 December, Prony followed the course of the river Brenta, in the so-called Riviera area, where he stayed until 14 December.

Visiting the course of the Brenta, the engineer observed its morphology, the containment works carried out during the period of the Republic and, above all, the locks.

In relation to the locks, Prony notes some of the specific terminology, with the corresponding French translation: «*Voici quelques termes d'art relatifs aux écluses: l'écluse en général,* sostegno*, Poteau tourillon,* Melo, *Poteau busqué,* Musone, *Ventelles,* Portelle» (p. 240).

Prony seemed to be particularly intrigued by the "cuts" that had been made to the ancient course of the Brenta – «*le taglio di Mirano et l'origine du Taglio nuovissimo di Brenta*» – to limit the damage caused by flooding and to allow the proper supply of water to the city of Padua via the River Bacchiglione.

On 14 December, Prony resumed his journey northwards, again via Verona and Vicenza. Having crossed Milan and the French border, the engineer returned to Paris, where he arrived, after several stops in the south of the country, on 18 February 1810.

BIB.E.N.P.C., Fonds Prony, c. Ms 1817/1, Journaux des missions en Italie, journal de mon troisième voyage d'Italie, 3ème mission depuis le 18 novembre 1809 jusqu'au 18 février 1810, 1809-1810.

40.

1810, 7 October, Paris

Gaspard de Prony began drafting the log of his fourth mission to Italy, dedicated primarily to the area of Rome and the Agro-Pontine, and so named *Mission de Rome*.

The *Mission de Rome* began on 7 October 1810, «*Parti de Paris à 11h½ du matin*» (p. 1), arriving in Rome on 6 November 1810, «*arrivé à Rome à 3 heures après le midi*» (p. 20).

Until September 1811, Prony was based in and around Rome, working on projects to reclaim and drain the Pontine Marshes.

On his way back to Paris, the engineer took the opportunity to stop in the Veneto-Adriatic area again, travelling through Ferrara, Rovigo and Padua, where he worked on his studies on the locks and the Po from 13 to 21 September 1811. From 22 September to 20 October, Prony stopped again in Venice, where he took the opportunity to meet some ministers of the Kingdom of Italy.

From 21 October 1811, the engineer began his return journey to Paris and, after several stops, recorded his arrival in the city on 28 November 1811: «*arrivé à Paris le lendemain* [the day after 27 November] *entre une et deux heures du matin*» (p. 298).

BIB.E.N.P.C., Fonds Prony, c. Ms 1817/2, Journaux des missions en Italie, journal de la Mission de Rome, depuis le 7 octobre 1810, jusqu'au 28 novembre 1811, 1810-1811.

41.

1806, 3 September, Monza

Viceroy Eugène Napoleon applied the decrees of 6 and 20 May of the same year to the Veneto departments, which had been initially exempt from application because they had just been annexed to the Kingdom of Italy.

ASVe, Biblioteca legislativa, Bollettino delle Leggi del Regno d'Italia, b. 27, vol. 18, pp. 891-894, decreto n. 182.

42.

1806, 24 October, Monza

Viceroy Eugène Napoleon announced that the nine-member commission of hydraulic engineers established by decree on 28 July 1806 – which was supposed to examine «*i piani esistenti per i lavori d'acque da farsi nei Paesi Veneti*» and present «*un piano generale dei lavori che possano conciliare gl'interessi di Venezia con quelli della Terra ferma*» – would be based in Padua, «*come il punto più centrale delle ex-Provincie Venete*».

ASVe, Biblioteca legislativa, Bollettino delle Leggi del Regno d'Italia, b. 27, vol. 18, pp. 995-996, decreto n. 212.

43.

1806, 30 November, Padua

Sanfermo, Inspector of «*acque, strade, ponti e lavori pubblici*», writes to the Prefect of the Department of the Brenta requesting that the 1807 expense breakdown include the performance of important works on the river, road and bridge network following the disastrous floods of 1806. The Inspector dwells especially on the situation of the rivers, «*dipingendone la triste situazione attuale. Non v'ha Dipartimento che ne conti una cifra così ragguardevole, e niuno ve n'ha in cui la disorganizzazione sia giunta al segno cui portossi in*

quelli di Padova». Sanfermo ascertains that «*si diramano senza misura, ed il tronco e le braccia presentano ovunque un aspetto diverso* [...] *eguali nei generali, ma dissimili nelle parziali loro posizioni, forma e natura*». The Inspector believed that the reason for this huge imbalance was the past decision to have the Brenta and Bacchiglione rivers flow out of the lagoon: «*esso* [the plan] *voleva mantenere l'inaccessibilità di Venezia impedendo alle acque di Terra Ferma lo sbocco libero con tutta la loro massa nelle Lagune*». Sanfermo – who does not actually make any specific proposals – therefore calls for a rebalancing of the situation and hopes that it will be achieved in «*un tempo in cui, o fosse necessario lasciare che la natura sì a lungo vincolata ripigliasse il primiero suo corso, o facesse duopo sovvertir questo piano, o sostituire uno novello* [...]».

ASPd, Prefettura, b. 3, 1806, Quadro generale delle operazioni da effettuare sulle acque.

44.

1807, 9 January, no location

Viceroy Eugène Napoleon established a Scuola delle acque e strade in Milan, appounting the Director and Professors after the proposals of the Director-General for Water, Bridges and Roads.

ASVe, Biblioteca legislativa, Bollettino delle Leggi del Regno d'Italia, b. 28, vol. 19, pp. 7-8, decreto n. 4.

45.

1807, 18 January, Padua

The Prefect of the Department of the Brenta, who was also President of the Magistrato di acque e strade, warned the Podestà of Padua that the Municipality needed to take charge of the reconstruction of the «*tratto di strada di Torricelle fronteggiante il Convento di Santa Chiara, non essendo navigabile il Canale sopra cui scorre la detta Strada, frapponendosi il fabbricato dei Molini di Torricelle*».

ASPd, Atti comunali, b.14, Titolo I, Acque, 1807.

46.

1807, 21 December, no location.

Minister Secretary of State Aldini – in the name of Emperor Bonaparte – decreed that the former Veneto states attached to the Kingdom of Italy were to be divided into seven departments «*dell'Adriatico, del Bacchiglione, della Brenta, dell'Istria, di Passariano, della Piave e del Tagliamento*», to be divided, in turn, into districts and cantons. The canton of Padua, including its «*circondario esterno*» – which stretched as far as Ponte di Brenta, Brusegana and Abano – had a population of 50503.

ASVe, Biblioteca legislativa, Bollettino delle Leggi del Regno d'Italia, b. 28, vol. 21, pp. 1401-1448, decreto n. 283.

47.

1809, 20 April, Padua

The chief engineer of the city of Padua, Letter, informed the municipal administration that the rivers had broken at several points in the territory: on the road to Vicenza, on the road to Venice, at Ponte di Brenta, at Stra and at Ponte San Nicolò, on the Roncajette Canal. According to the engineer

conseguenza di due fiumi disorganizzati (il Brenta ed il Bacchiglione) che da tanti anni dimandano il loro regolamento, furono le tante, e tante, inondazioni passate, come lo sono le pesanti calamità in colpa forse delle molteplici discrepanti opinioni dei Progettisti, che turbarono i consigli delle governative decisioni.

ASPd, Atti comunali, b. 67, Titolo I, Acque, 1809.

48.

1809, 20 April, Padua

The chief engineer of the city of Padua, Letter, sends the Podestà of the city requests for men and equipment to organise the work of fortifying the embankments in view of the forthcoming floods: «*per quanto riguarda i canali interni di questa città io devo interessare il di Lei zelo, Signor Podestà, affinché voglia somministrarmi i mezzi che indispensabilmente mi occorrono* [...]».

Letter draws up a detailed list of the places of action, the number of men required and the tools to be provided.

Foglio indicante il numero degli uomini atti a Lavoro di terra, che per ora occorrono onde presidiare nell'incamminata fiumana le arginature del fiume, e Canali interni di questa città.

In caso di maggior urgenza sarà ricercato quel maggior numero che fosse per occorrere.

Località

- Nel tronco del Brenta-Bacchiglione alla destra dalla Porta Saracinesca al Ponte di Legno

- Nel Naviglio di San Michiele alle Porte Contarine

- Nel Brenta-Bacchiglione a sinistra dalla Porta Saracinesca sino al ponte di San Leonardo

- Nel tronco stesso internamente al Ponte Molin, a sinistra tra i due Ponti dei Carmini

- Nel Canale di Santa Sofia dal Ponte di Porciglia a quello di Santa Sofia

[...].

ASPd, Atti comunali, b. 67, Titolo I, Acque, 1809.

49.

1809, 30 October, Padua

The Prefect of the Department of Brenta urges the Podestà of Padua to carry out certain works «*onde impedire ulteriori inondazioni della città*».

The works would cover the south-west area near the church of San Giacomo, the Codalunga area, the area of the San Prosdocimo convent and the area of the San Giovanni bridge.

ASPd, Atti comunali, b. 67, TitoloI, Acque, 1809.

50.

1809, 6 December, Padua

The Prefect of the Department of Brenta asked the Podestà of Padua to replace the doors of the locks along the outer moat, from the Saracinesca gate to the Savonarola gate, «*perchè sono fracide, e siccome è importantissima cosa, che in attualità di fiumana queste chiaviche debbano restar chiuse per lasciare la fossa della Città a solo uso di scolo interno della Città stessa, che tanto abbisogna di uno sfogo libero, e indipendente* [...]».

ASPd, Atti Comunali, b. 67, Titolo I, Acque, 1809

51.

1810, undated, Munich

The *Memoires* written by Charles Fréderic Wiebeking – hydraulic engineer, state councillor and Directeur Général des ponts et chaussées – aim to show the King of Bavaria, under whom Wiebeking was in service

and who had visited Venice and the region at the end of 1807, the works proposed by the engineer for the improvement of the ports of Venice, the islands of Lido and Malamocco (the so-called Lidi), the *réamenagement* of the courses of the Brenta and Bacchiglione and the navigation channels between Venice, Padua, Verona and the Adige. Wiebeking points out that in 1803, still under the first Austrian domination, the canals of Este and Padua, the Brentella canal, the course of the Bacchiglione and the dams on the Brenta were in appalling condition. The project conceived by the Austrians at the time, for the digging of a new bed for the Brenta, is considered even more damaging by Wiebeking, who defends the usefulness of the works he proposed to protect the Veneto and Adriatic coasts from flood damage:

A cette époque de 1803 des ingénieurs ont conçu le projet de creuser un nouveau lit à la Brenta: ce travail, nous ne craignons pas de le dire, n'aurait d'autre effet, que d'empirer le mauvais état des fleuves, qui circulent dans les états vénitiens.[...] *La prévoyante sagesse de sa Majesté l'Empereur et Roi Napoléon, garantira les cotes et la capitale de la mer adriatique des dangers qui le menacent.* [...] *Puisse ce mémoire mériter son attention et celle du Vice-Roi d'Italie* [...], p. 7.

The memoirs are organised into three parts: the first concerns the improvement of the passages between the islands leading from the open sea to the lagoon and Venice; the second deals with methods of protecting the islands and Venice from tidal damage; in the third part, Wiebeking presents his ideas on improving the courses of the Brenta and Bacchiglione rivers and the canals between Vicenza, Padua, Verona, the Adige and the sea.

In this last section, the engineer recognises the Brenta as the most important river in the Padua area, as well as one of the major tributaries of the Lagoon, flowing into the Adriatic at Chioggia. The Bacchiglione on the other hand, which also flowed near Padua, had an important hydro-geological relationship with the Brenta. For this reason, as Wiebeking himself points out, both courses required improvement. This would limit the frequency and incidence of floods, which ruined the fields, created inconvenience for the population and, above all, made it impossible to use the connecting canals, which were still widely exploited «*pour emporter les matières et nettoyer le lit du fleuve*», p. 41.

BIB.E.N.P.C., Fonds Prony, c. 4°6569/C412, Mémoires concernant les améliorations des ports de Venise, la conservation des Iles nommées Lidi, l'amelioration du cours de la Brenta, du Bacchiglione et des canaux de dessèchement et de navigation entre Venise, Padoue, Vérone et l'Adige; avec le projet d'un port de mer devant Trieste, et la description du port de Nieuwendiep en Hollande.

52.

1810, 15 October, Padua

The Prefect of the Department of Brenta, Zecchini, wrote to the Podestà of Padua, asking that the request to provide a list of all the water derivations from the city's major rivers and canals be fulfilled as soon as possible. The list was to indicate, among other things, the use of the individual derivations and the quality of the industries that exploited them, and was to be used to initiate a "modern" management of the water network. Annexed to the document is the undated and unsigned table with the list requested.

Regno d'Italia.

Padova, lì 10 ottobre 1810.

Il Prefetto de Dipartimento della Brenta a sig. Podestà di Padova.

Per esaurire pressanti superiori disposizioni occorre ch'Ella sig. Podestà, mi trasmetta sollecitamente un elenco dettagliato di tutte le estrazioni d'acque che si fanno dai fiumi e canali percorrenti in codesto Comune per uso di Edifizj, molini, irrigazioni ed altro, non senza indicare la qualità degli Opifizj, ed irrigazioni a cui servono le acque distratte, ed il nome de' rispettivi proprietari.

Si aggiungerà pure nell'indicato elenco i diritti di Pesca, se ve n'esistessero, e si compiacerà di accompagnarmi un esemplare delle Leggi, Editti e Regolamenti che dai cessati Governi furono emanati in diversi tempi sull'uso e contro l'usurpazione degli oggetti surriferiti.

In attenzione di pronto riscontro, mi pregio di protestarmi con distinta stima.

Zecchini.

Quadro che dimostra le estrazioni di acque che si fanno dai Fiumi e Canali percorrenti nella Comune di Padova per uso di Edifizj, e Molini coll'indicazione della qualità degli Opifici a cui servono e col nome de' rispettivi proprietari.

Estrazioni di acque	*Luoghi che percorrono*	*Qualità degli Opifici*	*Indicazioni de' rispettivi proprietari*
Bocche dell'Alicorno – Bastione del Bassanello	*Scorre lungo le mura della città, esternamente, dirimpetto la strada che passa lungo il muro degli Orti di S. Giustina, circonda 'Isola de Prato, lambisce l'Orto Pacchierotti e l'Orto Botanico e va a Ponte Corbo.*	*Orto Botanico* *Molini del Maglio* *Molini di Ponte Corbo*	*Di Regio Diritto* [illegibile] *Sig. Agostino Meneghini*
Diversivo detto dell'Olmo presso il Ponte di Legno	*Scorre per i Campi di Vanzo* [...].	*Molini del Pinto detti delle Acquette*	*Sig. Morosini* [illegibile]
Diversivo al Ponte di Torricelle	*Scorre per le Albare, passa per il Ponte della Morte, va a Ponte Corbo, lambisce l'Ospital Nuovo, esce alle gradelle di S. Massimo.*	*Folli per panni* *Molini* *Edificio da Seta* *Molini dell'Ospital Nuovo*	*Sig. Ang. Campolongo* *Sig. Ang. Campolongo* *Sig. Gio.Ba. Pastrovich* *Sig. Agostino Meneghini*
Diversivo presso S. Leonardo	*Scorre dietro la chiesa, passa per il Ponte della Bovetta, per quello di Codalunga, e si unisce al Canale che dal Ponte Molino va alle gradelle dei Carmini, e fuori dalla Città*	*Folli per panni*	*Regio Demanio*
Piccolo diversivo alle Porte Contarine	*Fa un piccolo circolo, subito ad unirsi al detto Canale delle Contarine*	*Molini*	*Sig. Giustiniani Veneto*

ASPd, Atti comunali, b. 97.

53.

1811, 5 February, Milan

Following the 1804 route and the farmers' demands for the use of the drains, viceroy Eugène authorised the partial burial (*la Botte*) of the Naviglio Canal in Bologna, in the Reno Department, which had already

been envisaged by a Papal Decree issued by Clement XIII in 1767. The canal would branch off from the Reno in the Casalecchio area and then flow into the Po. In April 1812, however, the construction of *la Botte* had still not been completed.

ANFr, O/2 Maison de l'Empereur, c.1068, Canal de Bologne, Aqueduc souterrain construit sous le canal de Bologne: mémoire et plan.

54.

1811, 21 February, Padua

The Prefect of the Department of Brenta, Zecchini, asks the Podestà of Padua for an account of the number of mills present at Ponte Molino and the names of their respective owners. The result is this «*tabella che dimostra il quantitativo di Molini situati al cosiddetto Ponte Molino in questa città di Padova* [...]», indicating the presence of a total of 26 mills.

ASPd, Atti Comunali, b. 97.

55.

1811, 6 March, Padua

The Prefect of the Department of Brenta, Zecchini, asks the Podesta of Padua to compile a new table as a detailed list of all the derivations of rivers and canals (cf. doc. 52) for all the sections of the Paduan territory.

Tabella di tutte le elevazioni ed usi di acque che si fanno nei Fiumi o Canali del Dipartimento Brenta.

Cantone	*Comune*	*Sezione*	*Proprietarj*	*Uso delle acque* ---------- *Molini, Edifizj, Macerazioni, Pesca, Irrigazioni.*	*Osservazioni*
					N.b. Dovrà specificarsi nelle Osservazioni se l'uso delle acque viene fatto in un Fiume o Canale [...], il nome del Fiume o canale ed il suo corso.

ASPd, Atti Comunali, b. 97.

56.

1811, 27 June, S. Cloud

Secretary of State Aldini, on orders from Bonaparte, decrees the execution of the plan «*per regolare le acque de' fiumi Brenta e Bacchiglione, presentato dall'ispettore generale Artico, in conseguenza del* [...] *decreto primo dicembre 1807*». The plan to regulate the two major rivers and their tributaries and diversions was approved and the work would be completed within six years and supervised by a specific civil magistracy «*composto da un rappresentante di ciascuno dei dipartimenti del Brenta, del Bacchiglione e dell'Adriatico*», presided over by the Prefect of Brenta and based in Padua.

ASVe, Biblioteca Legislativa, Bollettino delle Leggi del Regno d'Italia, b. 31, vol. 29, pp. 662-665, decreto n. 148.

57.

1811, 15 October, Padua

The Prefect of Padua, Zecchini, asks the Deputy Prefects, Podestà, Mayors and Municipal Clerks to «*corrispondere localmente ai Sigg. Ingegneri del Corpo Reale d'Acque e Strade quelle indicazioni*» relating to land that was «*paludosi e valivi del Dipartimento*» in order to draw up an «*esatto quadr*»*o* of the situation.

ASPd, Atti comunali, b.135, Titolo I, Acque, 1811.

58.

1812, no date, Paris

The catalogue of *Travaux des Ponts et Chaussées depuis 1800*, drawn up by the former deputy of the Assemblée Nationale Sébastien-Michel Courtin and addressed to Count Molé – State Councillor and *Directeur Général des Ponts et Chaussées* – documents the most important works carried out by the Napoleonic government within the territory of the Empire, from the beginning of the 19th century until the date of publication. The author not only describes the works carried out by the imperial engineers (already completed or still in progress), but also takes the opportunity to assess the conditions of works begun before the 19th century.

Courtin, who addresses Molé with reverence and enthusiasm, specifies that the work takes into account not only «*grands travaux*», but also smaller works of acknowledged importance, such as the construction of new routes on the site of old ones or the connection between two road branches: «*Il n'est question dans cet Ouvrage que des grands travaux. Il y en a un très grand nombre dont on ne parle pas: telles sont des parties de routes neuves construites sur les anciennes, d'autres qui forment des embranchements sur celles de première et de seconde classe*», pag. 8.

After explaining the organisation and operation of the Service des Ponts et Chaussées and the various roles that existed (director-general, inspectors-general, divisional and territorial inspectors, etc.), Courtin organised the catalogue by dividing the work into categories: roads, bridges, Napoleon's cities, telegraphs, canals, improving river navigation, reclamation, polders and commercial ports. In the roads section, in addition to the famous Simplon and Mont Cenis roads, which would ensure rapid exchanges of trade between the two countries, Courtin mentions the construction of other roads in Italy, such as that from Nice to Rome, the consolidation of that from Genoa to La Spezia and, above all, the construction of a road from the Mediterranean to the Adriatic, which would connect Livorno with Ancona.

In the canals section, the author specifies that, already under the sovereigns of the Old Regime, work had begun on the construction of a series of canals linking the great rivers of France, in order to improve commercial communications between the north and south of the country and, of course, the capital. In addition to this project, which was never completed, there was a project for a canal linking the Rhône and Rhine – «*On a vu, dans ce temps, beaucoup de projets présentés pour des canaux de jonction du Rhône au Rhin* [...]», p. 137 –, among the most important works carried out in the centuries preceding the First Empire Courtin mentions: the Canal du Midi of 1666 – which connected the Atlantic Ocean to the Mediterranean Sea – the Canal d'Orleans and the Canal de Briare – built between 1638 and 1691, connecting the Loire to the Loing – and the Canal du Centre – completed in 1791, which connected the Saône to the Loire, making it possible to streamline communications between Lyon and Paris by way of the Rhône and the Canal du Briare to the Seine.

Courtin describes the design and construction of the Canal de Saint-Quentin in 1810, the project (in progress) for the Canal de l'Ourcq and the project for a large canal linking the Rhône and Rhine, the so-called Canal Napoleon, which was never built:

Dans les premières années de ce siècle, on reprit ce projet, et le 5 floréal an 12, le Gouvernement approuva pour être exécuté [...] *le projet du canal de jonction entre le Rhône et le Rhin* [...]. *Ce canal* [...] *commence au-dessous de Dole, à la Saône; il se lie au canal de Bourgogne, en s'abouchant avec lui à Saint-Jean de Losne; il remonte le Doubs en passant par Besançon jusqu'à Montbéliard, où il prend les eaux de l'Halène; il remonte ensuite le vallon de l'Outran, il arrive à Valdieu, point de partage; ensuite il descend les vallées de la Largue et de l'Ill, passe à Mulhouse; de cette dernière ville, un embranchement se dirige sur Huningue et Bale, où se fait une prise d'eau dans le Rhin, et le canal principal se continue en passant à Neuf-Brissac, laissant à gauche le canal de ce nom, et à droite Markolsheim; il passe à Kraff, et arrive à Strasbourg, où il entre dans la rivière d'Ill*, p. 165.

In the improving river navigation section, Courtin explains how, in support of the construction of the connecting canals, numerous works were planned to improve the navigable rivers, one of the most important resources within the national and international navigation network: «*On avait reconnu par des exemples la haute importance de ces communications naturelles* [...]», p. 192. These improvements would guarantee a strong economic return to the state, thanks to specific agreements allowing it to exploit the payment of navigation rights for rivers, such as the Rhine, and canals, which would no longer be private or royal, but imperial:

Enfin le 50 floréal an 10, une loi établit un droit de navigation intérieure, qui est perçu sur les rivières et fleuves navigables, ainsi que sur les canaux. [...] *L'administration et la perception du droit de navigation appartenant toute entière à l'Empereur, a été mise par décret du 8 avril 1810, dans les attributions de la régie des Droits-réunis*, pp. 193-200.

A great deal of space is dedicated to the section on the navigation of the river Po: as its navigation involved both the Empire and the Kingdom of Italy, both states were to provide for its maintenance and repairs. The creation of a central body, the *Magistrato del Po* was envisaged. The *Magistrato* was made up of four commissioners on the banks and an auditor at the Council of State in Paris: it approved the works to be carried out, sending the documents to Paris for submission to the general council of the Service des Ponts et Chaussées and, of course, the emperor:

Les travaux qui concernent la navigation du Po, intéressant le royaume d'Italie autant que l'Empire français, ont besoin du concours des deux états pour les constructions, les réparations et l'entretien qui doivent maintenir ses rives, et préserver les terrains voisins des inondations. Afin d'avoir un point central d'où partiront les ordres nécessaires pour la direction à donner aux travaux, l'Empereur, par décret du 2 février 1811, a ordonné l'établissement d'une commission sous le nom de Magistrat du Po; elle est composée par un auditeur au conseil d'état et de quatre commissaires pris parmi les principaux propriétaires sur les rives françaises et italiennes. [...] *Après l'approbation de ces projets par la commission, ils sont envoyés au maitre des requêtes, directeur des Ponts et Chaussées, au-delà des Alpes, qui les transmet avec son avis au Directeur-général de l'administration à Paris, pour être soumis au conseil-général des Ponts-et Chaussées, et par le Ministre de l'intérieur, à l'Empereur*, pp. 200-201.

Courtin also mentions the design of numerous works along the course of the Rhône and, in particular, in Lyon – two toll roads, one on the Saône, in the faubourg Serin, and one on the right bank of the Rhône at Sainte-Colombe, on the way from Condrieu to Lyon; the repair of two embankments, one at the Tilsit bridge and one at the Saint-Vincent bridge; the construction of an imperial palace in Lyon in the area of the Perrache peninsula:

Un chemin de hallage sur la Saône, dans le faubourg Serin, à Lyon, et sa continuation hors de la ville. Un mur de quai, près de l'archevêché, en amont du pont de Tilsit; la réparation du mur de quai situé en aval du pont de Saint-Vincent [...]. *Les travaux Perrache étaient suspendus mais Sa Majesté ayant ordonné, le 3 juillet 1810, la construction d'un palais impérial à Lyon, ils ont été remis en activité, et font partie du terrain dépendant du palais.* [...] *Chemin de hallage de Sainte-Colombe, sur la rive droite du Rhône, pour aller de Condrieu à Lyon*, p. 217.

In his conclusions, the author lists the major works carried out, especially in Italy and in the capital. He mentions the new roads linking Italy and the interior of the departments conquered – those of the Simplon, the Mont Cenis, the road from Calvi to Sestri, the road from La Spezia to Sarzana, the road from Savona to Alessandria and the road from La Spezia to Porto-Venere; he mentions the construction of thirty new large canals and the improvement of the course of the Seine, the Loire and the Po: [...] «*routes neuves; celles des montagnes de Simplon, du Mont-Cénis, de Calvi à Sestri, de la Spezzia à Sarsanne, de Savonne à Alexandrie, de la Spezzia à Porto-Venere* [...]. [...] *Trente canaux (je en parle que des grands canaux);* [...]. [...] *Plusieurs rivières, dont la navigation est perfectionnée, entre autres la Seine et la Loire,* [...]», pp. 333-334.

In the capital, Courtin focuses on hydraulic works – the construction of four bridges, two new harbours and more than five kilometres of riverside:

La capitale, enfin, dont je n'ai point énuméré tous les embellissements; je n'ai du parler que des travaux qui sont dans les attributions de la direction générale des Ponts-et-chaussées, et qui consistent, pour les ouvrages neufs achevés, en quatre ponts, deux ports, et plus de 5000 mètres de quais, p. 335.

BIB.E.N.P.C., Fonds Prony, c. 8°2248, Travaux des ponts et chaussées depuis 1800, tableau des constructions neuves faites sous le règne de Napoléon Ier en routes, ponts, canaux et des travaux entrepris pour la navigation fluviale, les dessèchements, les ports de commerce.

59.

1814, undated, Paris

The *Compte général des Recettes et Dépenses faites pour la Construction du Canal de l'Ourcq et pour la distribution de ses eaux dans Paris* documents that the construction of the canal was ordered with a law dated 19 May 1802; the intake of the canal was established in Mareuil and the arrival of the canal was in Paris, in the La Villette basin, obtained thanks to the blockade imposed by the barrier. The canal was 94,838 metres long, with only 24,000 metres of its length within Paris.

ANFr, F/14 Travaux publics, c.524/28, Compabilité du service des canaux, État de situation, Canal de l'Ourcq (Seine).

60.

1822, 3 July, Padua

The Royal Provincial Delegation of the Lombard-Veneto Kingdom, in the person of Simone Stratico, Royal Councillor Delegate, enforced a provision that had been approved by the Prefecture of Brenta and the General Directorate of Water and Roads on 26 February 1811. The law called for «*raccogliersi in società consorziale* [...]*, sotto il nome di Consorzio degli Orti di Vanzo, tutti i possessori dei terreni compresi fra il Canale dell'Olmo, le cortine dei Bastioni Ghirlanda ed Alicorno fin oltre alla Porta di Santa Croce e il Canale delle Bovette dell'Alicorno stesso, che va ad irrigare l'isola del Prato della Valle* [...]». The purpose of the company was to *asciugare con facile scolo tutte quelle campagne e prati i quali costituiti in situazione assai bassa, vanno in gran parte dell'anno coperti dalle acque con notabile pregiudizio della forza produttrice di quelle terre e della costituzione atmosferica di que' contorni.*

ASPd, Atti Comunali, b. 97.

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