University of Nottingham
UK | CHINA | MALAYSIA

ENVIRONMENT, SOCIETY AND ECONOMY OF AN EARLY MEDIEVAL RIVER

The late Lombard and Carolingian Po valley (northern Italy), 715–924 AD

Marco Panato

Student ID: 4283805

Thesis submitted to the University of Nottingham for the degree of Doctor of Philosophy

MARCH 2020
University of Nottingham,
University Park, Nottingham, NG7 2RD

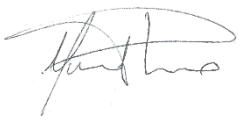
I certify that:

a) The following dissertation is my own original work.

b) The source of all non-original material is clearly indicated.

c) All material presented by me for other modules is clearly indicated.

d) All assistance received has been acknowledged.



Abstract:

This PhD thesis is focused on the different uses and meanings of rivers and freshwater for early medieval societies. It is based on a specific case study, the Po valley (northern Italy) between the eighth and the long ninth centuries AD. This period and geographical region have been mostly analysed by Italian and international historiography as it is one of the richest areas in term of documentary availability and has a complex socio-political and economic landscape very difficult to retrace in other parts of central and northern Europe.

I have approached the analysis of this landscape starting from a natural element the river and its uses, highlighted its early medieval environmental patterns and used these to understand how these influenced the socio-economic trends of the period between the Lombard and the Carolingian dominations. My aims are in fact to reconstruct and analyse the 'riverscape' recognising how far it is possible to distinguish between specific characteristics linked to the different kingships that ruled northern Italy and more local patterns.

In my research I conducted an interdisciplinary analysis between History and Archaeology, taking account also on the geoenvironmental data available for the landscape. This methodological approach brought to light a more complete spectrum of the riverscape highlighting different angles and perspectives. Finally it has been possible to a) achieve the complete reconstruction of the early medieval historical landscape, b) recognise the elements that characterised Lombard, Carolingian and local patterns along the river and its water, and c) recognise the circuits of men and goods that lived on the river and contributed to the formation of the Po valley riverscape.

Table of Contents

Table of Figures

To Gianki,

Thanks for everything

Acknowledgements

This thesis started to take form in my mind since I decided to work on early medieval rivers in the chilly spring of 2014 while I was starting my very first international experience in a foreign country. As a fresh MA student at the University of Bologna in Italy, my formation has strongly been influenced by the great historians of the School of the Alma Mater who paid particular attention to environmental and agrarian studies of the middle ages in their studies. The teaching of Vito Fumagalli was still fundamental to the lectures of his students, Bruno Andreolli and Massimo Montanari, as well as in the following generation of professors that passed under the shadow of the two towers, like my mentors Giuseppe Albertoni and Tiziana Lazzari, who I will always consider the first inspirations for my work. At that time, however, I would never have expected to continue my river studies in my doctoral adventure, and to pursue these studies at Nottingham. I can say, at this point, that this process (far from being concluded) would never have seen the light without a huge support and help from several people.

First of all, I have to thank my supervisors Ross Balzaretti and Mark Pearce for having accepted me under their mentorship and supported me throughout these three years. Without their guidance, meticulous corrections and constant help this thesis would never have seen a proper form. Among all the Nottingham teams of archaeologists and historians I must thank for their huge support and occasional discussions Roberta Cimino, Richard Goddard, and Chris Loveluck. From all the UK academic community my thanks go in particular to Caroline Goodson, Jinty Nelson, Jonathan Jarret and Rachel Stone for the stimulating discussions, for the constant encouragement in my research and for having accepted me and introduced to the seminars on early medieval history at the *Institute of Historical Research* in London. Huge thanks inevitably also to Chris Wickham for his advice and suggestion to consider Nottingham as home for my doctoral studies.

This thesis took form also because of the contributions and support from scholars and researchers from several countries and institutions. In Germany, many thanks to Lukas Werther, for his friendship and collaboration – which I am sure will grow in the next years – and for introducing me to the DFG Priority Program 1630 on late antique and early medieval harbours. Still east of the Rhine, particular thanks go to Thomas Meier for having invited me in Heidelberg and for the stimulating discussion on the relationship between rivers and rural settlements, and to Bernhard Muigg, for his help and interesting technical discussions on early medieval watermills. In addition, huge thanks go to all the Italian community of brilliant new and established academics from all around the globe with whom I have had the

opportunity – over the past years – to meet and discuss with. Here in alphabetical order: Michele Campopiano, Enrico Cirelli, Manuel Feltri, Stefano Ferrari, Edoardo Manarini, Fabio Saggioro, Paolo Squatriti, Paolo Tomei, Giacomo Vignodelli, Giorgia Vocino, Luca Zivagno, and Giulia Zornetta, as well as all the other friends and colleagues that I met in my stays in Bologna and Lyon and in all the research travels I have done in these years.

My sincere thanks go to Letty Ten Harkel and to all the *Medieval Settlement Research Group*, for letting me join the editorial team of *Medieval Settlement Research*, and also to David Civil for the very first editorial project, *Midlands Historical Review*, which I have taken part in since my first months in Nottingham.

I must also mention Fabio Saccoccio, to whom I am much in debt for all the technical help, the collaborations, the productive discussions and the precious time spent together outside the working hours and the late nights at the desk. Of course, I do not want to forget the other PhD colleagues in the Humanities Building, in particular: Mila Andonova, Michele Baitieri, Camilla Bertini, Jen Caddick, Lavinia Cerioni, Carl Dixon, Giovanni Hermanin, Esther Lewis, Alex Marchbanks, Jamie Smith, Elisa Vecchi, Mariele Valci, Paz Ramirez, Chiara Ravera. To all of them a sincere thank you for all the support, the quick chats, the conferences and projects realised together.

One of the most important people I met in these years in Nottingham and who aided me in so many ways is Paolo Dolce. Thanks for the friendship, the encouragement, the chilling time at the Opulence's Edge, and the constant remind to keep it 'Mello'. A huge thank you then to all my family and friends, from the mountains of Rovereto to all around the world. Even if physically distant, they have always been my backup in joyful and sad moments, and it is mainly down to them that I have become the person I am now.

As final but nonetheless most important remarks, my most truthful thanks go to my parents, Emanuela and Luigi, for all the massive help in the past years and also nowadays, and for having always believed in me and my work, and to Marcella, my strength, my fundamental support and continuous push to always be a better man.

Introduction: Rivers and society in Lombard and Carolingian northern Italy

The study of watercourses and rivers is an important topic for historical research of the early medieval period. Rivers have always been a central stage for socio-political and economic dynamics. Their waters were preferable routes for movements that facilitated exchanges and connections, being complementary to road systems inherited from the Roman era. Rivers were also places of production and land management, contributing significantly to the economic development and growth of cities and settlements in rural areas, forming original landscapes.

On the other hand, these 'riverscapes' also implied a terrible danger. Testimonies of inundations and river course changes are often present in early medieval documents, as in the description of the sixth-century floods in Paul the Deacon's *Historia Langobardorum*.[1] The archaeological evidence also shows dramatic changes in those environments that forced people to deal with and adapt to the river. Nevertheless, rivers were still a central environment in early medieval times.

These aspects, however, are just preliminary but still significant indicators of the importance of rivers in early medieval societies. In the late Lombard and Carolingian periods, between the eighth and the long ninth century (as named in a conference at the McDonald Institute in Cambridge almost ten years ago),[2] the renewed attention by political leaders for the care and management of watercourses and river environments had led scholars and researchers to ask themselves why rulers spent a significant amount of their administrative legislation on this issue.[3] Nevertheless, the means by which societies were interconnected with rivers are quite obscure, leaving room for several possible explanations.

The principal aims of this thesis are, in fact, the reconstruction of the riverscape, as the relationship between the river environment and the human activity in the Po valley, and the recognition in this territory and period of the influence that different Lombard and especially Carolingian kingships had on it. The role of the Frankish dynasty, in particular, has

[1] See Chapter 1.4. note 60.
[2] The terminus ante quem considered in the thesis, as evident in the title is the 924, year of Berengar I's death. In fact, the policy of Berengar on the Po valley riverscape is directly connected to the previous late Lombard and Carolingian measures as explored especially in Chapter 3 and 4. However, check of later tenth-century documents and archaeological materials has been necessary in order to understand previous measures and patterns that represent some of the core parts of the thesis.
[3] See Chapter 4.2

always been considered as the principal game changer in the early medieval socio-economic and political scenario, especially after the formulation and the debate on the Pirenne thesis.[4] In this thesis, instead, I want to discuss more deeply the actual impact that the Carolingians had on the riverscape, its exploitation and management looking directly at the sources and the evidence linked to the river, taking a bottom-up research path from the geographical and natural element (the river) and examining the retraceable human impact that led to the formation of the early medieval Po valley riverscape.

The relationship between watery environments and societies, the adaptation to and exploitation of river and wetland landscapes led to the formation of specific patterns that are part of what has been called *amphibious culture*. This term was formulated by Petra van Dam in a recent article on the modern era Dutch case study.[5] In her paper, the author argues that the low-lying areas of the seventeenth-eighteenth-century Netherlands shared an amphibious culture, outlining a model that may also be applied to other wetland areas and periods. Van Dam highlights three general features of an amphibious culture: 1) the presence of water management, 2) the elevation of settlements, 3) water-based transportation methods with the capacity to move easily and swiftly between wet and dry areas of the landscape. These characteristics can also be applied to our case study, as argued especially in Chapter 3, but the analysis of the early medieval Po valley riverscape can also extended van Dam's definition finding original patterns that differentiate this context and period compared to others. The recognition of these patterns is as well a crucial aim of the thesis, and their analysis will contribute to understand more in depth the relationship between riverine local communities and the northern Italian socio-economic and political networks.

1. Early medieval water and rivers: an historiographical context

The perception and uses of water in medieval societies is a complicated topic that has interested scholars since the mid-twentieth century as a branch of environmental history and associated with the study of landscape.[6] In Europe, the interest in this discipline was born following the cultural impact of the French *Annales* school, after the Second World War. Since the 1950s, the concept of landscape was developed associating geographical features with

[4] See later note 23.
[5] P.J.E.M. van Dam, 'An Amphibious Culture. Coping with floods in the Netherlands', in P. Coates *et al*. (eds.), *Local Places, Global Processes: Histories of Environmental Change in Britain and Beyond* (Oxford, 2016), pp. 78–93.
[6] On this subject see A.T. Grove – O. Rackham, *The nature of Mediterranean Europe: an ecological history* (Boston 2003).

the human presence and generating new attention from scholars for the so-called *cultural landscape*, an expression coined by Carl Sauer in his works in the 1920s.[7] Marc Bloch and his *Annales* colleagues revaluated the importance in particular of the rural world as a place in which environmental and anthropogenic features find common ground. Following these innovative ideas, in the years after, research on rural landscapes fed an interdisciplinary debate, extending investigations and connecting scholars from different fields. Also today, in a period of current concern about environmental issues, landscape investigations have great value among scholars. In fact – paraphrasing Simon Swaffield – with the study of landscapes it is possible to find a way of knowing past and present worlds.[8] Even if Swaffield does not examine early medieval landscapes in particular, the meaning of his words can be considered a constant reminder for the study of several historical topics and periods.

Following this cultural trend, a consistent historiography developed concerning numerous aspects related to water in the middle ages. Particularly for early medieval times, the interest in water has been developed by scholars of different disciplines and institutions. One of the first important works that nowadays could be considered one of the milestones of this discipline is Paolo Squatriti's *Water and society in early medieval Italy*.[9] Before him, watery environment topics of the early middle ages had been analysed by several scholars like Paul Dutton's work on Carolingian hailstorms and Richard Hoffman's analysis of fishing activities, but they mainly focused on specific activities linked to the uses of water.[10] Also in French historiography it is possible to see evidence of preliminary interest in early medieval water topics such as the relationship between water and city in André Guillerme's *Les temps de l'eau*.[11] In Italian historiography a strong tradition of environmental history on water and its uses developed since the pioneering studies of the University of Bologna school led by Vito Fumagalli, especially related to agricultural purposes and the management of wilderness and cultivated soils.[12] However, if we consider just the study of water or wetland, Squatriti's

[7] C.O. Sauer, 'The Morphology of Landscape', *University of California Publications in Geography* 2 (1925): 19-53. The *Annales* scholars where influenced by such view. The history of landscape studies in Great Britain has different roots. See W.G. Hoskins, *The Making of the English Landscape* (London 1955).

[8] S. Swaffield, 'Landscape as a way of knowing the world', in S. Harvey – K. Fieldhouse (eds.), *The cultured landscape: designing the environment in the 21st century* (Abingdon 2005): 3-24.

[9] P. Squatriti, *Water and society in early medieval Italy, AD 400-1000* (Cambridge 2002).

[10] P.E. Dutton, 'Thunder and Hail over the Carolingian Countryside', in D. Sweeney (ed.), *Agriculture in the Middle Ages: Technology, Practice and Representation* (Philadelphia 1995): 111-137. R. Hoffman, 'Fishing for Sport in Medieval Europe: New Evidence', *Speculum* 60 (1985): 886-887.

[11] A. Guillerme, *Les temps de l'eau : la cité, l'eau et les techniques* (Seyssel 1983). In Guillerme's work the influence of the first pioneering, geographical and socio-economic studies of Fernand Braudel is quite evident, see *La Méditerranée et le monde méditerranéen à l'époque de Philippe II* (Paris 1949).

[12] V. Fumagalli, *Terra e società nell'Italia padana. I secoli IX e X* (Torino 1974).

work could be considered the ground-breaking study of this field and the starting point of further research, especially for the methodology and the range of topics analysed. Early medieval water and its issues were subsequently examined in depth in 2007, during the 55th *Settimana di studio* of the *Centro Italiano di Studi sull'Alto Medioevo* (CISAM) in Spoleto, leading to an international debate on the topic.[13]

Among the numerous themes concerning water environments in early medieval times, those linked to rivers have developed further research, especially connected with the economic exploitation of watercourses. Interesting works have been published since the 1980s and they focused particularly on exchange circuits and social networks – mainly testified by large collections of original documents – among the centres of power along the riverbanks. The principal rivers that have been studied were those of north-western continental Europe, particularly the Loire, Seine and Rhine. Starting from the analysis of the polyptychs of the northern abbeys, for example, Jean-Pierre Devroey in the 1970s and 1980s described the circuits of man and goods along those basins for the abbeys of Prüm and Saint-Germain-des-Près.[14] At the beginning of the 2000s, another type of study on river and socio-economic networks was Matthew Innes' *State and society* that provided a detailed survey on river exploitation and management patterns in the middle Rhine valley, an area at the heart of Carolingian Europe.[15] In the same years, very interesting contributions on the early medieval circuits of exchange concerning the salt production and distribution along the Loire and Meuse in France have been carried out between 2002 and 2008 by Olivier Bruand.[16] In the last decades, in addition, a major interest in river environments has been developed starting from archaeological contributions, as demonstrated by Éric Rieth's studies on the fluvial navigation in France or Fabio Saggioro's works on the Po valley rural wetlands.[17]

More recently this connection between human presence and rivers developed a different perspective, for example in Ellen Arnold's new diachronic project, *Cultural and Religious Views of River in the Middle Ages*. The project was launched in 2012 and shifted

[13] *Settimane* 55 (2008).

[14] J.P. Devroey, 'Les services de transport à l'abbaye de Prüm au IXe siècle', in *Revue du Nord* 61 (1979): 543-569; Id., 'Un monastère dans l'économie d'échanges : les services de transport à l'abbaye de Saint-Germain-des-Prés au IXe siècle', in *Annales. Economies-Société-Civilisations* 39 (1984): 570-589.

[15] M. Innes, *State and Society in the Early Middle Ages. The Middle Rhine Valley. 400-1000* (Cambridge 2000).

[16] O. Bruand. 'Pénétration et circulation du sel de l'Atlantique en France septentrionale (VIIIe-XIe siècles)', *Annales de Bretagne et des Pays de l'Ouest* 115/3 (2008): 7-32. Id., *Voyageurs et marchandises aux temps carolingiens: les réseaux de communication entre Loire et Meuse aux VIIIe et IXe siècles* (Bruxelles 2002).

[17] É. Rieth, *Des bateaux et des fleuves : Archéologie de la batellerie, du néolithique aux temps modernes en France* (Paris 1998); F. Saggioro, 'Paesaggi in equilibrio: uomo e acqua nella Pianura Padana Centrale tra IV e IX secolo', *AnTard* 20 (2012): 47-67.

research to a cultural perception of rivers, arguing that on socio-economic aspects research has gone far enough in the analysis of such characteristics of rivers.[18] An example of this type of cultural historical research concerning riverscapes of medieval Italy is that coordinated by Riccardo Rao and his collective work on the Sesia river in Piedmont, northern Italy, which is also an interesting case study of socio-economic patterns within the Po valley itself.[19]

In fact, the statement promoted by Arnold's view that the study of socio-economic realities should be left aside may be hazardous for themes connected to early medieval rivers. Arnold's approach could fit better for the late medieval and early modern periods, given the vast amount of sources – particularly written – that permits deep analysis of economic circulation and systems along river waters. For the early middle ages, even if it is possible to reconstruct some circuits for singular institutions along European rivers, it is difficult to have a clear inclusive view, considering that many actors that played important roles along the rivers are not represented in written or archaeological sources at all. For this reason, the debate on the socio-economic exploitation of early medieval rivers must be continuous and updated, helped by the interaction of different disciplines, new scientific data and the comparison with other realities.

Following this need, the present thesis focuses the history of the Po river and northern Italy in late Lombard and Carolingian periods. This topic – with all its aspects – has been studied since the very beginning of the last century. But it was in the 1950s – after the publication of Cinzio Violante's *La società milanese* – that a major interest and awareness concerning the socio-economic meanings of the river increased.[20] In his work, Violante examined the exchange system developed along the Po and its tributaries between the eighth and tenth centuries, particularly in the section between Pavia and the Adriatic sea. Even nowadays Violante's work is considered the first comprehensive historical research on the early medieval Po system. Nevertheless, he – as his successors – never focused on the everyday relationship that men and women developed with the river, focusing instead on larger socio-economic perspectives linked to trade.[21]

Nowadays, the study of economic systems linked to rivers is one of the most vivid topics of international debate, especially due to its ability to join different disciplines and allow the growth of an international dialogue between different specialists. Research on

[18] E. Arnold, *Negotiating the Landscape: Environment and Monastic Identity in the Medieval Ardennes* (Philadelphia 2013).
[19] R. Rao (ed.), *I paesaggi fluviali della Sesia fra storia e archeologia. Territori, insediamenti, rappresentazioni* (Florence 2016).
[20] C. Violante, *La società milanese nell'età precomunale* (Bari 1953).
[21] See Chapter 4's introduction on these issues.

early medieval southern European rivers like the Po, however, lacks comprehensive studies that take account of different disciplines, especially for the eighth and ninth centuries. This thesis fills this gap for one of the most important river valleys of Europe that – at that time – represented the most important communication route linking northern Europe, the heart of the Frankish kingdom, with the wider Mediterranean world.[22]

The rise of the Carolingians adds even more interest to this topic. In fact, since the debate generated around the thesis of Henri Pirenne at the beginning of the twentieth century, the Carolingian period has always been considered a sort of turning point, in which the new Frankish rule touched and conditioned every aspect in early medieval Europe, promoting cultural renaissance, economic growth and military affirmation of the Franks in Europe.[23] Rivers and the life developed around them should therefore also have been influenced by this multifaceted movement, and understanding how these two worlds interacted will be a fundamental aspect of this thesis, as already pointed out above.

In fact, this research provides a more exhaustive perspective than hitherto on the early medieval riverscape in northern Italy and how this conditioned or was conditioned by the different societies who managed it. Starting from the study of natural elements – like a river – may help us to isolate specific patterns allowing to retrace in the territory signs of the Lombard and Franco/Carolingian presence, or – parallelly – it would allow a reconstruction of those local dynamics linked to the riverscape that – even with some parallelisms with other cases in early medieval Europe – should highlight the formation of independent and autochthones societies leaving along the banks. Eventually, through the analysis of the Po valley riverscape, it will be possible to identify the tangible impacts on the river of the different dominations that ruled northern Italy at the dawn of the middle ages, and how the river environment conditioned both local and elite managements.

[22] Regarding the Rhône valley route: M. Panato, *Il Rodano in epoca carolingia (VIII e IX secolo). Un sistema economico-fluviale*, MA Thesis, University of Bologna (Bologna 2015): 157-163; M. McCormick, *Origins of the European Economy: Communications and Commerce AD 300-900* (Cambridge 2001): 64-86. A.R. Lewis, 'The Rhone Valley Route and Traffic between the Mediterranean and Northern Europe, 300-1200', in Id., *Medieval Society in Southern France and Catalonia* (London 1984): 1-13.

[23] H. Pirenne, 'Mahomet et Charlemagne', *Revue Belge de Philologie et d'Histoire* 1 (1922): 77-86; Id., *Mahomet et Charlemagne* (Paris-Bruxelles 1937). On the Carolingian impact see the recent overview in M. Costambeys *et al*., *The Carolingian World* (Cambridge 2011).

2. Methodologies for a study of early medieval rivers and their applications in the Carolingian Po valley

Collaboration between specialists is now more crucial than ever for the reconstruction of early medieval riverscapes. The multidisciplinary research approach is, especially for the early middle ages, the only way to shower the lack of material and documentary evidence Nevertheless, the use of different kinds of data implies certain difficulties and is not always possible. In fact, new and old data collections are not always available for the analysed period and territory. For this reason, it is important to precisely define areas and time phases, in order to have a clear idea about the available materials and how they should be investigated. In this case the main focus is the eighth- and long ninth-century Po valley, but the following methodological approaches could easily be applied in other situations across Carolingian Europe, always considering the importance of regional and local particularities, which could develop significant changes in wide-ranging considerations.

Considering the availability of different sources, it is possible to delineate four main methodological approaches with their specific sources used for the analysis of riverscapes that all together allow an interdisciplinary exchange useful for the investigation from different point of views highlighting environmental, social and economic characteristics. These interdisciplinary methodological approaches have recently been proposed by Riccardo Rao in a recent theoretical manual on the landscape of medieval Italy and find a good application in the already mentioned volume edited by the same author on the medieval Sesia.[24] Rao asserts that these approaches have the principal benefit of allowing a dynamic and fluid picture of the early medieval landscape avoiding a unilateral and static dimension. As Rao aimed in his recent works, in this thesis I want to propose a fresh and dynamic overview of one of the most important medieval landscapes highlighting the complexity and the changes of the river environment and society in a specific timeframe.

The first methodological approach is called the *regressive method* and was first proposed by Marc Bloch.[25] Historians are the principal users of this method and even if this could have some serious limitations, it is still a good starting point for understanding how past societies perceived their territory. As suggested by the name, this method consists in analysing the historical landscape through the study of written sources from the most recent trying to reconstruct the habitat rewinding the film of the landscape from the actual state until its origins. As highlighted by Rao, the *regressive method* is useful especially for long

[24] R. Rao, *I paesaggi dell'Italia medievale* (Rome 2015): 19-40. Id. (ed.), *I paesaggi fluviali.*
[25] Rao, *Paesaggi*: 24-25. M. Bloch, *Les caractères originaux de l'histoire rurale française I* (Paris 1931).

periods of time, comparing different written sources in order to have an idea on how natural-environmental dynamics changed and characterised those centuries. For this method, the principal available sources are chronicles, annals and all those texts which describe natural events or geographical features of rivers such as the hagiographical lives of saints, private records, letters, travel reports and – of course – historical cartography. In parallel, in my research I conducted a systematic investigation of royal and private charters allowing to understand more specifically the practical uses of the river by both locals and elites, which helps to identify socio-economic trends and water management linked to the riverscape. Analysing this type of legal sources, it has been possible, in fact, to circumscribe the attention on a specific timeframe, in this case the eighth and the long ninth centuries.

A second method is, instead, focused on morphogenetic and hydrological factors, characteristic of geographical research in order to understand the shape of river courses and the composition of the surrounding environment. Research in this field has increased in recent years especially after the publication and the availability of new proxy data, allowing an inclusion of specialists like geologists and geographers in historical analysis. The examination of morphogenetic factors of a specific river valley includes the study of its natural forms, creating a diachronic analysis for understanding the characteristic elements of specific landscapes and their evolution throughout the centuries. Nevertheless – as Rao pointed out – this method risks giving a deterministic reading of landscapes, leading them back to fixed schemes through time. For this reason, it is necessary to avoid any conclusion which confuses times and periods, trying to link specific traces on the soil to precise historical contexts. Unfortunately, this option is not always possible, making the study of morphogenetic factors only partial and incomplete.

An additional contribution – often applied in combination with the mentioned morphogenetic factors – is the already-mentioned collection of new pollen and charcoal data, the new proxy data that in recent years allowed the development of disciplines like historical ecology, archaeozoology and historical climatology. The increased application of these proxy data on historical research has permitted a huge step forward, not only in morphogenetic studies of medieval rivers but also in historical research, promoting a constant interdisciplinary dialogue between different specialists and allowing a more complete study of agricultural and environmental features. However, despite the increase of these studies in very recent years, this new kind of research is still in its initial stage not allowing a complete coverage of all the areas analysed, and only in the future it would be possible to have a clearer picture. In fact, proxy data were provided by the collection of organic remains of vegetation and animals at individual sites or through coring surveys in

Alpine glaciers, and Alpine tree-ring analysis,[26] not allowing – also in this case – a clear coverage over the entire territory but generating, through sparse case studies, general trends that could have been useful only with a comparative analysis with other sources.

A final and crucial investigative method for historical riverscape that I have adopted in this research is provided by archaeology itself. In particular, a specific branch of the archaeological research started at the end of the 1970s in England in which scholars' interest was focused on the growth and the development of urban settlements along riverbanks and coastal areas, so-called *waterfront archaeology*. Along with the more classical archaeological studies, waterfront archaeology played an important part in the research of riverscape even though in northern Italy, this type of studies are limited to specific coastal sites, with a limited number in the inland Po valley, as will be explained in the following chapters.[27] Since the 2000s, however, archaeology has enlarged its techniques of data collection from laboratory and surface surveys. This was possible especially because of new technological applications like light or laser detections (LIDAR, *Light Detection and Ranging or Laser Imaging Detection and Ranging*) and information systems (GIS, *Geographical Information System*), which permit clearer illustrations of materials and surveys themselves, and a better understanding of their distribution in the landscape, helping in the identification of the link between society and environmental features.[28] In general, through archaeological surveys it is possible to investigate several aspects of the riverscape like navigation, water management and river exploitation allowing to understand tools, production techniques, settlement dynamics and circuits of exchange.

In this thesis, these different methodologies have all been followed with specific intentions according to the topic of each chapter. In fact, the multidisciplinary approach characterises all the parts of the thesis along with a constant comparison with the most important examples outside the geographical delimitations of this research. Only through these methods it has been possible to recognise the principal characteristics of the early medieval Po valley riverscape and how to analyse them in their geographical and temporal context.

[26] See Chapter 1.3 and 1.4.
[27] See introduction to Chapter 3 on waterfront archaeology.
[28] Rao, *Paesaggi*: 19.

3. Structure of the thesis

The thesis is, therefore, divided into four main chapters in which four principal topics of the eighth- and long ninth-century Po valley will be analysed. The study starts with a geographical description and reconstruction of the environmental characteristics of the Po valley in the early middle ages, especially in the period between the sixth and the tenth centuries. This is a crucial aspect in order to understand not only the geographical boundaries of the research, but also the socio-economic possibilities of early medieval northern Italy, the resources available and the actual river shape, completely different aspects from the present day. Chapter 2, on the other hand, is dedicated to the study of the communication system active in northern Italy between the eighth and the early tenth centuries. The ancient Roman road and the land routes network, as well as the navigation circuits will be described. Transport and movements, in fact, are one of the fundamental features of river life and understanding how these circuits developed will help in order to provide a solid base on which it will be possible to insert the socio-economic patterns of the third and fourth chapters.

After these two descriptive chapters, Chapter 3 and 4 are, in fact, focused on more complex relationships between human presence and river in the eighth and early tenth-century Po valley. The first aims to explore the link between rivers, wetlands and urban and rural settlements. This is a crucial topic in order to understand how the societies adapted and used the watercourses and how the river environment conditioned their growth or decadence. Cities and rural villages developed along the rivers and were part of the riverscape. In particular for the urban cases the first part of Chapter 3 defines and explores the concept of the early medieval *river city*, identifying some patterns that differentiate these settlements from the other cities in early medieval northern Italy, showing traces of the mentioned amphibious culture that characterised the Po valley riverscape. The river, in fact, conditioned both urban and rural economies but also social forms of aggregations and land management both in cities and the countryside. The fourth and last chapter, therefore, is focused on the socio-economic networks developed along the river and on the principal economic exploitations derived from the uses of freshwaters.

Following this structure, the thesis considers all the principal patterns of the riverscape from environmental features, transport and movement issues to the different aspects that characterised human presence and activity along internal waters. The recognition and the analysis of this amphibious culture will provide at the end of the reading a more clear awareness on how the riverscape, as interaction between fluvial environment and human activity, was organised in the early medieval Po valley and how the political

changes happened in this crucial period at the beginning of the middle ages, especially after the Carolingian conquest of northern Italy, were influencing these local amphibious dynamics.

In this division, a specific chapter dedicated to the cultural perspective on the river of contemporaries has not been included. However, these aspects – which are not the main aim of the thesis – have been taken into consideration in the writing of each chapter. Understanding the cultural impact of the river helps also in the formulation of an overall perspective linked to socio-economic patterns of the early medieval Po valley. Only through the knowledge of this cultural perspective of the river for those societies would it be possible to understand how they were inserted in that world and how they belonged together.

1. Geography of the early medieval Po valley

Opening the analysis of the Po valley with an introductory description of the early medieval geography and landscape of its territory is crucial for creating a solid base, a sort of detailed stage in which it is easier to introduce characters, patterns and events of the relevant period.

Specifically, for the Po valley at the end of the early middle ages, it is partially possible to recreate its main geographical features – along with the entire northern Italy – following three main types of sources written, geomorphological and partially also archaeological. To begin with the written sources, good information is available in Greek, Roman and late antique texts. Useful descriptions are particularly in Polybius, Strabo and Pliny the Elder's geographical works, while some *itineraria* of merchants and diplomats are described in other classical authors such as Caesar, Cato and Tacitus. In addition, also mythical travels contribute to enrich the geographical picture of northern Italy like Apollonius Rhodius's description of the Po in his *Argonautica*.[1] Early medieval authors are certainly less representative for this survey. However, annals, chronicles and few literary works contain important information for this period such as in Paul the Deacon's *Historia Langobardorum*, as well as some travel descriptions made by churchmen and laity.[2]

The second type of source is perhaps the most scientific one and concerns long term geomorphological analysis that aims to explain the evolution of the Po plain in the geological epoch of the Holocene. In my analysis I mainly examined the *Carta Geomorfologica della Pianura Padana* edited in 1997, along with numerous publications by geographers.[3] Even if there are other maps relative to several specific areas of northern Italy, the *Carta Geomorfologica* of 1997 is the most comprehensive and wide-ranging work for the entire Po and Friuli-Venetian plains, allowing the formation of a clearer idea of what to the evolution of the Po and its tributaries courses. I used specific maps of single territories only for the section of the river east of Cremona, which was the most fluctuating section of the river. Also pollen and other charcoal

---

[1] Polybius, *Histories*, II/14: 6; 15: 9-10; 22: 1; 32: 2; III/34: 5-6; XII/28a: 4; XXXIV/10: 15-21. Strabo, *Geographica*, IV/6; V/1. Pliny the Elder, *Naturalis Historia* III: 117-122. Caesar, *De Bello Gallico*, I/39: 1; IV/5: 2; 20: 3; 21: 5. Cato, *Origines*, II, Id., *De Agricultura*, Tacitus, *Agricola*, XXIV: 3. Apollonius Rhodius, *Argonautica*, IV: 595-618. For a complete description of the ancient written sources for the geographical description of northern Italy see R. Chevalier, *Geografia, archeologia e storia della Gallia Cisalpina. Il quadro geografico* (Torino 1988).

[2] Particularly, for a description of the Alps see *HL*, II, 9. For travels and travellers in northern Italy see M. McCormick, *Origins*: 799-810, and S. Matthews, *The Road to Rome. Travel and Travellers between England and Italy in the Anglo-Saxon Centuries* (Oxford 2007).

[3] G.B. Castiglioni (ed.), *Carta Geomorfologica delle Pianura Padana* (Florence 1997). For the other geographical and geomorphological work see later in the chapter.

data are available for many archaeological sites in northern Italy. However, every type of source will be examined more in details in each pertinent section.

1.1. Geomorphological features of northern Italy

The Po-Venetian plain is the largest Italian alluvial basin. Extending over an area of 46,000 square kilometres, this territory includes 71% of all the plain areas in the Italian peninsula and it comprises 15% of the current territory of Italy. The plain is crossed by several waterways and the most important is the Po river. It is approximately 650 kilometres long and it drains an area of 75,000 square kilometres.[4] The Po valley is an ancient tectonic depression originated by an Oligo-Pliocene subsidence and filled intermittently between the end of the Tertiary and the Quaternary. It is formed by Alpine and Apennine glacial and water actions, and it has a marine coastal area of 270 kilometres in length, characterised by low depth, wide tides, sandy dunes and lagoons, especially around the delta area. It has an average elevation of 105 metres above the sea level, but with peaks of 500 metres in the western part, corresponding to present-day Piedmont (Fig. 1).

From the Alps, the northern natural border of the Po plain, the Po valley is nourished by numerous water sources which originate from glaciers and subterranean springs; the latter are numerous in the Pre-Alps along the so-called *Risorgive* belt (spring belt).[5] The source of the Po itself is at Pian del Re on the northwest side of Monviso in the heart of the Cottian Alps. Following a west-east direction, the main left-side Po tributaries that take water supplies from the Alpine area are the Dora Riparia, Stura, Malone, Orco, Dora Baltea, Sesia, Agogna, Ticino, Olona, Lambro, Adda and its tributary the Serio, Oglio – with the Mella and Chiese as tributaries – and Mincio. Other important rivers, which have Alpine origin but flow in the Venetian-Friulian plain, are the Adige, Brenta, Piave, Tagliamento, and Isonzo.

The southern edge of the Po valley is marked by a second mountain chain, separating the plain from the Italian peninsula: The Ligurian and Tuscan-Emilian Apennines. In their north-western part, they face the Langhe and Monferrato hills, while the south-eastern limit is the Marecchia valley. Excluding the river Tanaro which has an Alpine origin, the other principal right-side tributaries of the Po fed with the Apennine water resources are: the Scrivia, Staffora, Tidone, Trebbia, Nure, Chiavenna, Arda, Taro, Parma, Enza, Secchia, Panaro. From the Apennine

[4] For further geographical description of the characteristics of the Po valley see M. Pellegrini, 'The Po valley: methods of study, geological characteristics and example of geomorphological evolution', in M. Panizza *et al.*, *I.G.U. Commission on Geomorphological Survey and Mapping. Proceedings of the 15th plenary meeting* (Modena 1979): 83-101.

[5] G.B. Castiglioni, 'Geomorphology of the Po Plain', *Suppl. Geografia Fisica e Dinamica Quaternaria* 3/3 (1999): 10-11.

chain other rivers take their path to the sea. The main water courses are those of the Reno (with its tributaries Setta, Sillaro, Santerno, Senio), Lamone, Montone, Savio, Rubicone and Marecchia.

The Po-Venetian plain can be divided in four different geomorphological territories:[6] The plain north of the Po, the southern plain, the Venetian-Friulian plain and the delta area. The northern plain is higher and steeper than the southern. Here, watercourses are wider, and more regular, rapid and constant in their flow. These natural features, combined with the uplift of the Alpine chain, caused the downstream subsidence of the central plain, which is instead dominated by floods. In the Pre-Alpine section just before entering in the plain, watercourses have built their paleochannels transporting heavy materials (carbonate, porphyric and dolomitic rocks are common in this Alpine segment). These fans – thanks also to better permeability of the soil compared to the Apennine side – contain overflows that are not extended in this part of the plain. The northern plain could be divided in two sectors: a western one (the Piedmont and Lombard plains until the river Ticino) and another more central-eastern section (between the Sesia/Ticino and Mincio rivers, before descending in the Venetian plain). The western Piedmont territory has some differences compared to the nearby Lombard and Emilian plains: the absence of a Pre-Alpine belt between mountains and plain, limited tectonic activity and depositional and erosive events, and similar characteristics for high and low plains.[7]

The central Lombard Po plain is characterised by 17 alluvial fans between Ticino and Mincio, corresponding to the left tributaries of the Po.[8] The zone between the Alps and the Po river is, in fact, characterised by an alluvial depositional belt built from the late Pleistocene to the present by glacial-fluvial and river sediments. The topographical area of the rivers is characterised by different geomorphological units: 1) the mountain areas, covered by pre-quaternary formations including all the Alpine rocks, mostly limestone, sandstone and marl; 2) the moraine systems and the old Pre-Alpine terraces, formed by glaciers and the rivers during the Pleistocene, positioned in amphitheatre settings; the main level of the plain, between the Pre-Alps and the Po, divided into an 3) upper part, marked by coarser fluvio-glacial and river deposits, and characterised by a steadier hydrography compared to the 4) lower meandric sections of the Holocene alluvial plain, where finer materials (sand and silt) are transported by seasonal floods.[9]

---

[6] For a general description in which these four parts are highlighted see G.B. Castiglioni, 'Geomorphology of the Po Plain': 7-20. M. Marchetti, 'Environmental changes in the central Po Plain (northern Italy) due to fluvial modifications and anthropogenic activities', *Geomorphology* 44 (2002): 361-373.

[7] P. Gabert, *Les plaines occidentales du Pô et leurs piedmonts* (Gap 1962).

[8] F. Guzzetti *et al*., 'Large alluvial fans in the north-central Po Plain (Northern Italy)', *Geomorphology* 18 (1997): 119-136.

[9] For further descriptions see *Ibid*.: 21-22 and M. Pearce, *Il Territorio di Milano e Pavia tra Mesolitico e prima Età del Ferro. Dalla carta archeologica alla ricostruzione del paesaggio* (Florence 1994): 19-23.

Like the northern plain, the southern is also divided into a higher plain near the Apennines and a lower one near the Po. The high plain is less wide than the sub-Alpine one and is formed by a rocky belt at the beginning of the river valleys which rapidly decreased their sloping grade, descending to the plain. The river valleys are characterised by numerous, shorter and steep, single-channel, alluvial fans.[10] These alluvial fans are the result of glacial dynamics, middle Holocene sedimentation and subsequent entrenchment phase developments. At the end of the fan, one or more long alluvial ridges are recorded along with their lower alluvial basins.

The low plain, through which the Roman *via Aemilia* passed, is under 100 metres above sea level with half of it under 25 metres. Here, soils are impermeable, favouring the formation of swamp and natural channels as the *Carta Geomorfologica* shows.[11] The main characteristic of this plain is the prevalence of elevated riverbeds and lower plains. Rivers had variable flows which – combined with their position and the absence of containment structures – bring a great instability of watercourses during their seasonal floods causing sudden changes of their course. Particularly for early medieval strata, archaeological fieldworks have found a widespread presence of clay indicating several flood deposits especially in urban settlements such as Modena.[12]

At the north-eastern edge of the Po plain, the Venetian-Friulian plain is part of the foreland basin of the eastern and south-eastern Alps.[13] This area extends approximately for 10,000 square kilometres from the Karst Mountain fringe, close to the present-day Slovenian border in its eastern side, to the Berici and Euganean hills near the cities of Vicenza and Padua as its western edge. Here a few features seen in central Lombardy are also evident, in particular the presence of the spring belt, which continues in the Pre-Alpine area as far as the Julian Alps.[14] In the eastern, Friulian side, several narrow uplifted tectonic terraces surround the area of Udine. The soil is composed of carbonate rocks (mostly limestones and dolomites) that form a large amount of clastic debris, which led to the deposition of hundreds of metres of gravel in the pre-mountain plain. This high plain has a dry surface because of the high permeability of gravelly sediments and the consequent depth of the groundwater table. On the other hand, the low

[10] Castiglioni, 'Geomorphology of the Po Plain': 9. S. Cremonini *et al*., 'The late-antiquity environmental crisis in Emilia region (Po river plain, Northern Italy): Geoarchaeological evidence and paleoclimatic considerations', *Quaternary International* 316 (2013): 162-178. For a specific analysis see S. Cremonini, 'Morfologie d'alveo e morfogenesi nella media pianura Padana: il caso del Panaro nell'età del Bronzo', in M. Cattani *et al*. (eds.), *Paesaggio ed economia nell'età del Bronzo: la pianura Bolognese tre Samoggia e Panaro* (Bologna 2010): 27-33.

[11] Castiglioni *et al*., *Carta Geomorfologica*, particularly table 2.

[12] G. Bosi *et al.*, 'A survey of the Late Roman period (3rd-6th century AD): Pollen, NPPs and seeds/fruits for reconstructing environmental and cultural changes after the floods in Northern Italy', *Quaternary International* 499 (2019): 3-23. S. Cremonini *et al*., 'The late-antiquity environmental': 162-178.

[13] See Marchetti, 'Environmental changes': 361-373.

[14] *Ibid*., p. 11.

plain, formed by the Alpine rivers' large alluvial fans, is characterised by silty-clayey sediments with a higher groundwater table. Large parts of the coastal plain (almost 4.000 km²) between the rivers Adige and Isonzo are below sea level and include the hinterland of Venice, Caorle, Marano and Grado lagoons.[15] In this area, Quaternary subsidence was continuous and, with the Holocene sedimentation, affects coastal lines, determining the formation of lagoons and sandy dunes.

Similar changes are also a characteristic of the last section of the Po-Venetian plain. The Po delta area is a roughly triangular territory delimited to the south by the river Reno, to the north by the Adige (Chioggia) and to the west by Ferrara where the two main branches of the Po delta (the Po of Volano at north and the Po of Primaro at south) divided. From a geomorphological and environmental point of view the delta represents the lowest and most instable and humid area of northern Italy. When it rains or when the sea level is rising, water tends to collect in the lower areas, especially under the sea level, which would be occupied by swamps, marshes and lagoons. The creation of these lagoons, in fact, is due to the actions of both the rivers and the sea, which form a hybrid landscape between fresh and marine waters, so that we cannot describe this territory only as a riverscape.[16]

1.2. Hydrology between Roman and medieval times

The historical study of the hydrology of the Po valley has developed since the 1980s with a specific focus on the Roman and contemporary periods.[17] Thanks to this recent interest and the publications generated, it is now possible to identify a possible scenario of the early medieval Po, mainly based on historical sources and maps, and aerial photography relative to river paleo-channels.

The hydrology of the Po valley has constantly developed as a result of sedimentation and climatological changes: in Quaternary warm periods the sea advanced as far as the present-

[15] Castiglioni (ed.), *Carta Geomorfologica*; A. Fontana *et al*., 'Alluvial megafans in the Venetian-Friulan Plain (north-eastern Italy) Evidence of sedimentary and erosive phases during Late Pleistocene and Holocene', *Quaternary International* 189 (2008): 72.

[16] A.A. Rucco, *Comacchio nell'Alto Medioevo. Il paesaggio tra topografia e geoarcheologia* (Florence 2015): 27-38. M. Stefani – S. Vincenzi, 'The interplay of eustasy, climate and human activity in the late quaternary depositional evolution and sedimentary architecture of the Po Delta system', *Marine Geology* 222-223 (2005): 19-48. M. Bondesan *et al*., 'New evidence on the evolution of the Po-delta coastal plain during the Holocene', *Quaternary International* 29-30 (1995): 105-110.

[17] D. Castaldini, 'Evoluzione della rete idrografica centropadana in epoca protostorica e storica', in *Insediamenti e viabilità nell'alto ferrarese dall'Età Romana al Medioevo (Cento, 8-9 maggio 1987)* (Ferrara 1989): 115-134. M. Pellegrini, 'Evoluzione della rete idrografica e dell'alveo del Po', in I. Ferrari – M. Pellegrini (eds.), *Un Po di carte. La dinamica fluviale del Po nell'Ottocento e le tavole della Commissione Brioschi* (Reggio Emilia 2007): 33-50. M. Calzolari, *Il Po in età romana. Geografia, storia e immagine di un grande fiume europeo* (Reggio Emilia 2004).

day Parma area, while during colder phases the delta area was located as far as the territory of present-day Ancona or Pescara. These fluctuations caused the most important – and sometimes dramatic – changes of the riverbed in its easternmost part.[18] In fact, between Turin and Piacenza in the past – and also today – watercourses have always been controlled and contained by the southern Apennine hills and mountain, especially the Monferrato hills and the Pavese and Piacentino Apennines, and by the northern high plain. In this tract, in proximity of the riverbanks, floods and inundations had a maximum basin range of 7km.[19] For these geomorphological reasons it is possible to consider the area between Piacenza/Cremona and the Adriatic Sea the most changeable and conditioned by floods and fluctuations of the riverbed.

These events and changes conditioned the geography and human settlements in these regions since prehistoric times. In the second millennium BC, during the Bronze Age, in the area between the Province of Cremona and Reggio Emilia around the localities of Casalmaggiore and Guastalla, the Po was divided into two branches: a principal branch, the Po of Adria, and a second, southern branch, followed by other minor parallel branches, the Po of Spina. During the Iron Age, starting from the eighth century BC, the Po switched from its riverbed in the area around Brescello and Guastalla to the north, creating the course of the Po Vecchio as far as the present-day Secchia river mouth. In the Roman period, the Po followed the course of the Po Vecchio passing through the present-day localities of Luzzara (RE), Suzzara (MN), Gonzaga (MN), Pegognaga (MN) and San Benedetto Po (MN). This section of the Roman Po is well documented also in the written sources of those period, such as Titus Livy' description of the military campaigns against Hannibal, and corresponds to the *Eridanus* or *Padus* of Pliny the Elder, or the *Παδόα* (Padòa) of Polybius.[20]

In the early middle ages, there are two main differences compared to the Roman period. The first is in the river section between Casalmaggiore (CR) and Ficarolo (RO). During the first part of the early middle ages, the Po followed the Roman period riverbed between Luzzara and San Benedetto Po. In the last part of the early medieval period, starting approximately from the seventh century, the river started to migrate north, occupying new channels and causing general hydrographical disruption.[21] The progressive creation of this northern branch is evident also in the tenth century when the localities of Luzzara, Suzzara and San Benedetto are described as *in insula* (island), surrounded by two river branches.[22] After the ninth century AD, this northwards shift ended, probably after a reprise of drainage and banks works in that area. The increase in

[18] Pellegrini, 'Evoluzione': 33-50.
[19] *Ibid*.: 34-35. Castiglioni (ed.), *Carta Geomorfologica*.
[20] Titus Livius, *Ab Urbe Condita*, XXI, 25, 13. See also Calzolari, *Il Po in età romana*: 30-60, and Pellegrini, 'Evoluzione': 49, note 5.
[21] *Ibid*.: 35-36.
[22] *Ibid*.: 36.

human management led eventually to the so-called *rotta di Ficarolo* between 1152 and 1192, causing the deactivation of the Po Vecchio, and the shift to a new active channel very similar to the current course, along with several hydrographical changes in the low Emilian plain and the delta area.[23]

A second major difference in the early middle ages compared to the Roman period regards the delta area. According to recent reconstructions by Marco Bondesan, between the sixth and the fourth centuries BC the main axis of the Po divided in two in the area of present-day Ferrara at Codrea (FE): the first northern branch directed to Copparo (FE), including other branches which gave origin to the Po of Volano (the *Olane* in Polybius); the second branch passing close to the ancient Etruscan city of Spina on its way to the Adriatic.[24] During the early middle ages, at the end of the seventh century, this southern course was replaced by the Po of Primaro, which followed a north-south direction starting from Ferrara as far as the ancient location of Argenta and then turned eastward coasting the Comacchio valleys until reaching the Adriatic sea 15 kilometres south of Spina.[25] The northern Po of Volano on the other hand from the sixth century became the principal branch, causing an advancement of the coast-line east of present day Codigoro.[26]

Between these two principal branches a series of other natural and artificial watercourses developed from the Etruscan-Roman period and were also active in medieval times, such as the *Sagis* (medieval *Triba*), the *fossa Augusta* and the *fossa Flavia*, or the late antique canal of the Motta della Girata and the Padus Vetus.[27] These watercourses were probably all active during the early medieval period in their original forms or slightly changed as a result of flooding and sedimentation events making north-south movements on the water possible, at right angles to the natural direction of the main branches of the delta.[28]

[23] *Ibid*.: 37.

[24] Rucco, *Comacchio*: 27. M. Bondesan, 'Origine ed evoluzione della geologica della Pianura Padana e del territorio ferrarese', in A. Broglio – M. Bondesan, *Storia di Ferrara I* (Ferrara 2001): 17-39. Id., 'L'evoluzione idrografica e ambientale della pianura ferrarese negli ultimi 3000 anni', in Broglio – Bondesan, *Storia di Ferrara*: 227-263.

[25] Rucco, *Comacchio*: 27-29.

[26] Rucco, *Comacchio*: 28-29. Stefani – Vincenzi, 'The interplay': 19-48. M. Bondesan – A. Giovannini, 'Evoluzione Geomorfologica della pianura costiera fra Codigoro e Comacchio (Ferrara)', *Annali dell'Università di Ferrara. Scienze della Terra* 5/3 (1994): 27-38.

[27] Bondesan – Giovannini, 'Evoluzione': 27-38. S. Patitucci-Uggeri, *Carta archeologica medievale del territorio ferrarese II. Le vie d'acqua in rapporto al nodo idroviario di Ferrara* (Florence 2002): 15-18.

[28] Rucco, *Comacchio*: 33-34.

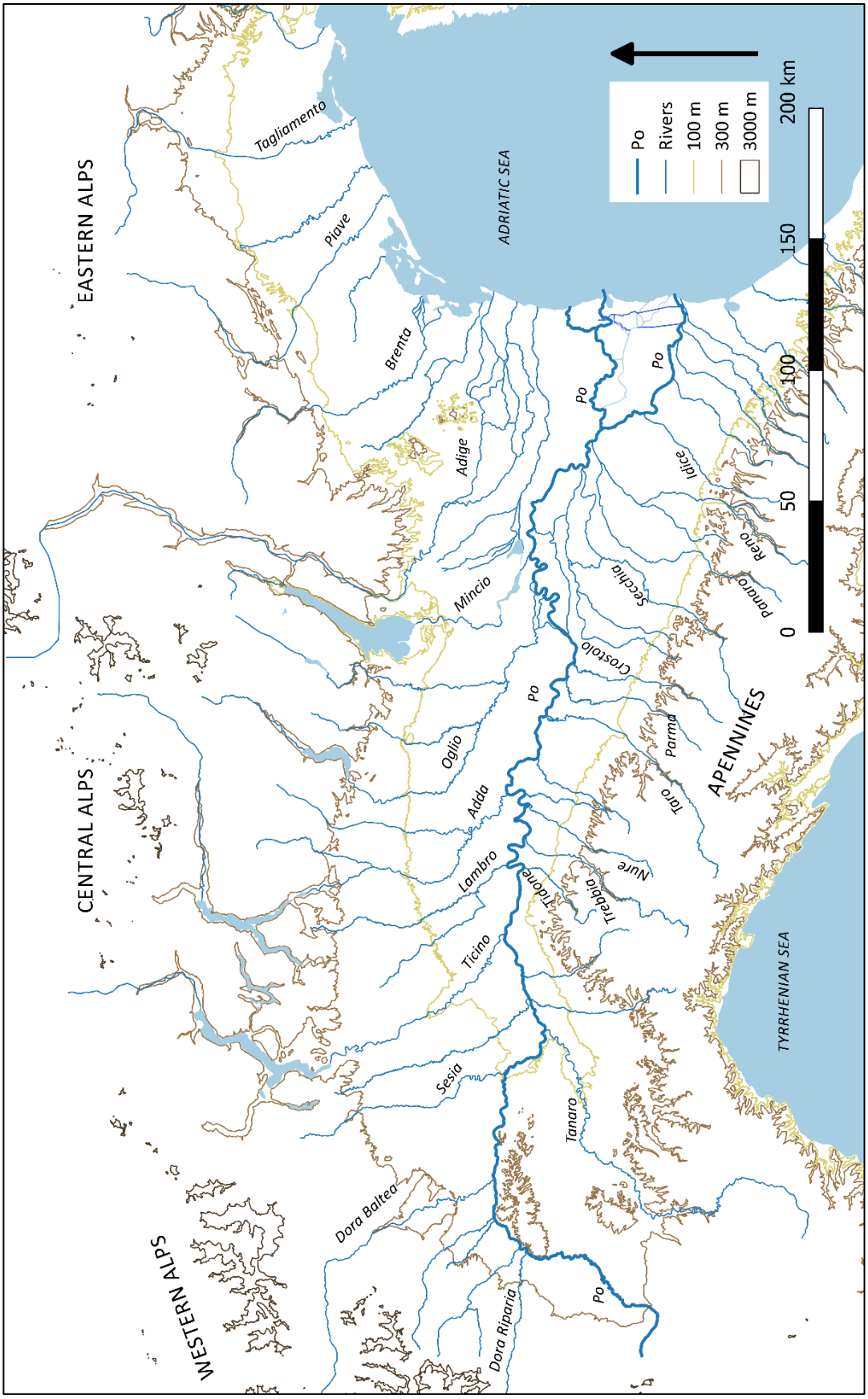


Fig.1: Early medieval physical northern Italy and Po valley

1.3. Vegetation and animals in early medieval northern Italy

Reconstructions of early medieval flora and fauna in northern Italy were made by historians starting in the 1960s, mainly based on the analysis of written sources like polyptychs and diplomas.[29] At the beginning of these studies, these sources were the only ones available and suitable for the study of issues related to the environment, agriculture and breeding. However, more recently, archaeology developed two new branches in collaboration with other disciplines, allowing a more detailed reconstruction of the environmental characteristics of the Po valley: archaeobotany and archaeozoology.

Studies of the ecology and archaeobotany of the Po valley were conducted very recently, since the 2010s, especially after the increase in analyses of pollen, non-pollen palynomorphs, seeds and fruits, wood/charcoals and other plant remains.[30] The use of this new data increased in more recent years and, in 2015, 148 sites were catalogued in the entire Italian territory in which it has been possible to recognise materials suitable for medieval studies.[31] In northern Italy, only 30 sites provide evidence of early medieval archaeobotanical materials (Fig. 2), confirming that evidence is scarce for the period between the sixth and tenth centuries compared to Roman and late medieval periods.[32] Despite the limited evidence, these new data provide a better picture of the early medieval historical landscape in both urban and rural areas.

Overall, the Po valley is a mixture of different environments which favoured the numerous species of plants and animals. During the early medieval period, in particular after the fifth century, there is a progressive advancement of the woodland, with a particular abundance of oak (*Quercus deciduous*) and hornbeam (*Carpinus*), parallel to a restriction of the area under cultivation.[33] The greatest extent of the forests seems to be reached in the seventh century, after decades of unstable temperatures (Late Antique Little Ice Age) and political instability due

[29] Fumagalli, *Terra e società*.

[30] The vegetation history in northern Italy, especially for Emilia Romagna, has its first precursor in C.A. Accorsi *et al.*, 'An overview of Holocene forest pollen flora/vegetation of the Emilia Romagna region-northern Italy', *Archivio Geobotanico* 5 (1999): 3-27. For seeds/fruits and food history, a first synthesis was M. Hopf, 'South and Southwest Europe', in W. Van Zeist (ed.), *Progress in Old World Palaeoethnobotany* (Rotterdam 1991): 241-277.

[31] A.M. Mercuri *et al*., 'Pollen and macroremains from Holocene archaeological sites: a dataset for the understanding of the bio-cultural diversity of Italian landscape', *Review of Palaeobotany and Palynology* 218 (2015): 250-266.

[32] For example, in the excavations in the medieval market square of Parma with layers dated from the third-second centuries BC to the tenth-eleventh century AD, early medieval remains are almost absent: G. Bosi *et al*., 'Seeds/fruits, pollen and parasite remains as evidence of site function: piazza Garibaldi – Parma (N Italy) in Roman and Medieval times', *Journal of Archaeological Science* 38 (2011): 1621-1633.

[33] M. Magny *et al*., 'Holocene palaeohydrological changes in the northern Mediterranean borderlands as reflected by the lake-level record of Lake Ledro, northeastern Italy', *Quaternary Research* 77 (2012): 382-396.

to the Gothic wars, as testified also by archaeobotanical analyses.[34] Written documentation, historiographical and archaeological-archaeobotanical research, since the pioneering studies of Vito Fumagalli, stresses the importance of this scenario, extending this description to the ninth century at the time of the Frankish conquest of Italy, when *incultus*, wilderness, wood, waters and wetlands were still the main characteristics of the Po valley landscape.[35]

However, according to the archaeobotanical results from numerous sites in northern Italy, this picture presented by many historians cannot be applied to the whole Po-Venetian plain. In contrast with other northern Italian sites, in the southern Veneto Euganean hills, the forests seem to open to grassland, and a large part of these fields were constantly cultivated throughout the Pre-Roman, Roman and medieval periods. Petra Kaltenrieder explains this anomaly because of its position close to riverbanks with high flooding risk, even if more detailed analysis on wetland vegetation are needed to confirm this hypothesis.[36] Another stimulating aspect emerging from the analyses in the Euganean hills is the use of fire for clearance, which seems to spread during medieval times,[37] confirming that not all the Po valley was covered by forest, but there were other types of environment.

---

[34] M. Rottoli, 'Reflections on Early Medieval resources in northern Italy: the archaeobotanical and archaeozoological data', *Quaternary International* 346 (2014): 20-27. On the Late Antique Little Ice Age see U. Büntgen *et al*., 'Cooling and societal change during the Late Antique Little Ice Age from 536 to around 660 AD', *Nature Geoscience* 9 (2016): 231-236, M. Sigl *et al*., 'Timing and climate forcing of volcanic eruptions for the past 2,500 years', *Nature* 523 (2015): 543-549.

[35] For example, around the *curtis* of Zena – one of the San Silvestro of Nonantola's possessions in the territory of Piacenza – the landscape was supposed to be dominated by a large *silva*, S. Gelichi, 'L'età post-antica: qualche riflessione sui metodi e sui risultati', in A. Cardarelli – A. Malnati (eds.), *Atlante dei beni Archeologici della Provincia di Modena I: Pianura* (Florence 2003): 53-57.
Also at the *curtis* of Migliarina in the territory of Modena, donated by Adelchi (772) and Lothar (837) to the monastery of Santa Giulia of Brescia, the presence of large areas of *incultus* is documented around the property (E. Barbieri *et al*., *Le carte del monastero di S. Giulia di Brescia I (759-1170)*, in CDLM, 22, 26). At Migliarina archaeological fieldwork have also found an early medieval large axe, possibly used for cutting the nearby trunks and vegetation: Cardarelli – Malnati (eds.), *Atlante Modena I*, CA 164: 179.
On historical studies on the early medieval forest after Fumagalli, *Terra e società*: C. Higounet, 'Les forêts de l'Europe occidentale du V^{e} au XI^{e} siècle', *Settimane* 13 (1966): 343-398; C. Wickham, 'European forests in the early Middle Ages: landscape and land clearance', *Settimane* 37 (1990): 479-548; B. Andreolli – M. Montanari (eds.), *Il bosco nel Medioevo* (Bologna 1988); M. Montanari, 'La foresta come spazio economico e culturale', *Settimane L* 50 (2003): 301-340; P. Squatriti, *Landscape and Change in Early Medieval Italy: Chestnuts, Economy, and Culture* (Cambridge 2013).
Archaeobotanical analyses also attest the presence of extensive forest, for example the analysis of the wooden materials and pollen at the sites of Sant'Agata Bolognese (BO) or Cava Pedocca near Concordia sulla Secchia (MO): S. Marvelli *et al*., 'Il paesaggio vegetale ricostruito attraverso le analisi polliniche', and M. Marchesini – S. Maravelli, 'Paesaggio vegetale e utilizzo delle risorse legnose: il contributo delle analisi xilo-antracologiche', in Gelichi *et al.* (eds.), *Un Villaggio*: 294-307, 324-341. M. Marchesini *et al*., 'Ricostruzione ambientale del paesaggio vegetale nella bassa pianura modenese-mantovana in età medievale', in M. Perboni (ed.), *Terre di confine: il territorio di San Giovanni del Dosso e del destra Secchia nel Medioevo* (San Giovanni del Dosso 2003): 137-142.

[36] P. Kaltenrieder *et al.*, 'Vegetation and fire history of the Euganean hills (Colli Euganei) as recorded by Lateglacial and Holocene sedimentary series from Lago della Costa (northeastern Italy)', *The Holocene* 20/5 (2010): 679-695.

[37] *Ibid*.: 679-695.

Similarly also in the plain north of Modena, evidence for cultivated fields have been recently identified by fieldwork in the territory between Nonantola and Sant'Agata Bolognese,[38] confirming that, despite the initial assumption of a landscape dominated by extensive forest interspersed by wetlands, the cultivation of fields was continuous in some areas despite the increase of woodland. In addition, near the most important cities like Piacenza, Verona or Brescia, clearer signs of centuriation survived. For example, fieldwork and aerial photography in the territory north-west of Reggio Emilia, in the territory around Parma and Piacenza, and more generally in the pre-Apennine plain along the *via Aemilia* show traces of the Roman centuriation land division system allowing us to hypothesise preservationist continuation throughout the early middle ages.[39]

Apart from some exceptions such as the Euganean hills and the Nonantolano, archaeobotanical analyses in the other early medieval sites of the Po valley show an increase in the number of tree species. In addition to the prevalence of oak and hornbeam, a first pattern was the increase of fir (*Abies*). Furthermore, the pollen and carbon data show a reprise of beech (*Fagus*), and the spread into new areas of fruit trees like walnut (*Juglans regia*) and sweet chestnut (C*astanea sativa*).[40] This period is characterised by a reduced incidence of hazel (C*orylus*), whereas in some areas there was a reprise of hemp plantation (*Cannabis sativa*) to the same levels as in the fourth-fifth centuries as attested at sites of the lower Mincio valley like Nogara.[41] The presence of *plantaginaceae* is, in addition, another principal feature of early medieval environments in the Po valley and, from the late-sixth century, it is possible to notice a more marked presence of sorrel (*Rumex acetosa*).[42]

On the other hand, archaeobotanical studies also stress a strong anthropic impact on vegetation, attested by widespread polyculture of cereals and general food plants, especially

[38] M. Librenti – A. Cianciosi (eds.), *Nonantola 3 – Le terre dell'Abate. Il Nonantolano tra Tardantichità e Medioevo* (Florence 2011): 9-11.

[39] P.L. Dall'Aglio, 'Centuriazione e geografia fisica', in P.L. Dall'Aglio – G. Rosada (eds.), *Sistemi centuriali e opere di assetto agrario tra età romana e primo medioevo* (Roma, 2010), 279–298. But for the Romagna see also the recent C. Fiorotto, 'Human settlement and environment in the Medieval Bassa Romagna (Ravenna, Italy) c. 800-1200', *Medieval Settlement Research* 33 (2018), 28–39. G. Schmidt, *Atlante aerofotografico delle sedi umane in Italia. La centuriazione romana* (Florence 1989): tab. 27-28.

[40] Chestnut was already present in some parts of northern Italy like Piedmont, and since the fourth century several areas of Lombardy and Liguria were also covered by chestnut trees. E. Castiglioni – M. Rottoli, 'I semi e i frutti delle dispense', in B. Grassi – C. Miedico (eds), *Il profumo del pane e delle castagne: dai semi di Cislago ai panini di Angera I: la villa rustica di Cislago, i resti organici e il paesaggio agroalimentare in età romana* (Arona 2015): 41-54. R. Balzaretti, 'Chestnuts in charters: evidence for specialised production in early medieval Genoa and Milan', in R. Balzaretti *et al*. (eds.), *Italy and Early Medieval Europe* (Oxford 2018): 356-371; Squatriti, *Landscape and Change*: 169-180.

[41] C. Ravazzi *et al.*, 'Lake evolution and landscape history in the lower Mincio River valley, unravelling drainage changes in the central Po Plain (Northern Italy) since the Bronze Age', *Quaternary International* 288 (2013): 195-205. For Nogara see Chapter 3.2.

[42] *Ibid*.: 195-205.

close to settled areas.[43] Although there are some differences between sites, Rottoli identifies barley (*Hordeum vulgare*), rye (*Secale cereale*) and einkorn (*Triticum monococcum*) as the main cereal products in early medieval northern Italy. Emmer (*Triticum dicoccum*) seems to have been abandoned since the Roman times, and spelt (*Triticum spelta*) is also poorly attested.[44] Oat (*Avena sativa*) seems to spread in the Alpine areas (Valtellina and Trentino) as does buckwheat (*Fagopyrum esculentum moench*). Other minor cereals in the plain are broomcorn millet (*Panicum miliaceum*), foxtail millet (*Panicum italicum*), sorghum (*Sorghum*) and cockspur grass (*Echinochloa crus-galli*).[45]

Furthermore, legumes also show a certain popularity, in particular: bean (V*icia faba minor*), lentil (*Lens culinaris*), pea (*Pisum sativum*), chickling (*Lathyrus cicero/sativus*), bitter vetch (*Vicia ervilia*), common vetch (*Vicia sativa*), chickpea (*Cicer arietinum*) and black-eyed bean (*Vigna unguiculata*).[46] Fruits, on the contrary, are recorded principally in waterlogged sites, as Rottoli shows, but there is much variety: figs (*Ficus carica*), apples (*Malus domestica*), pears (*Pyrus*), melons (*Cucumis melo*), cucumber (*Cucumis sativus*), bottle gourds (*Lagenaria siceraria*), strawberries (*Fragaria vesca*), mulberries (*Morus nigra*), almonds (*Prunus dulcis*), pomegranates (*Punica granatum*), raspberries (*Rubus idaeus*) and jujubes (*Ziziphus jujuba*). Moreover, analyses of charcoal, pollen and seeds/fruits show that viticulture, olive and chestnut trees became a fundamental part of the landscape starting from the early sixth century, both in plain and mountain areas.[47]

This very varied polyculture has been explained by both historians and palaeo-botanists as motivated by the need to guarantee crops with short cycles of growth, permitting two or more harvests per year.[48] These cereals could also have been cultivated because of their hardiness, requiring less attention than other cereals. Further reasons may have been the reduced areas under cultivation and possibilities of storage, or climatic variations that might have forced this kind of production. The importance of straw derived from cereals like rye and

[43] Rottoli, 'Reflections': 20-27.
[44] E. Castiglioni – M. Rottoli, 'Coltivazioni ed uso del legno in Valtellina dalla protostoria all'età moderna: i dati archeobotanici di Sondrio, Teglio e Bormio, e Analisi archeobotaniche, schede', in V. Mariotti (ed.), *La Valtellina nei secoli: studi e ricerche archeologiche II: Ricerche e materiali archeologici* (Mantova 2015): 909-936.
[45] E. Castiglioni – M. Rottoli, 'Broomcorn millet, foxtail millet and sorghum in northern Italian Early Medieval sites', *PCA* 3 (2013): 132-141.
[46] Rottoli, 'Reflections': 20-27.
[47] *Ibid*.: 20-27. A.M. Mercuri *et al*., 'A marine/terrestrial integration for mid-late Holocene vegetation history and the development of the cultural landscape in the Po valley as a result of human impact and climate change', *Vegetation History and Archaeobotany* 21/4-5 (2012): 353-372. B. Andreolli, 'Paesaggi della vite e paesaggi dell'olivo nell'Italia dell'alto medioevo', *Settimane* 54 (2007): 317-358.
[48] Castiglioni – Rottoli, 'Broomcorn millet': 140-141. Montanari, *L'alimentazione*.

einkorn for industrial purposes should also not be underestimated. Whatever the reason, polyculture constituted a novelty compared to the previous Roman period.[49]

Overall, looking at archaeobotanical sources, the scenario seems to reflect an integrated and self-sufficient system of production and consumption. In the eighth and ninth centuries, the vegetation is quite stable, but in the tenth century the cultivated area begins to expand and the forest cover to reduce. The socio-economic and political patterns in northern Italy especially in the Carolingian period seem to have some impact on the environment, giving birth to new trends that led in the following centuries to new monocultures and a return to an economy based on the *cultus* (field economy).[50] These changes, however, do not seem to be significant in the late-eighth and ninth centuries, even if more specific archaeobotanical analysis should be conducted at new sites, trying to cast some light on the variable landscapes of northern Italy, as in the example of the Euganean hills.

Similar trends can also be recognised in the fauna data. Compared to archaeobotanical studies, archaeozoological research on early medieval northern Italy is a relatively new phenomenon and studies to date are few in number. After some initial works, especially on sites like Monte Barro in Lombardy, the first overview for the Italian data was by Frank Salvadori in 2011.[51] The data has been primarily obtained from bone fragments almost exclusively collected from food waste pits. Looking at these studies, a first difference compared to Roman times, in which the most consumed animal was cattle, is the preference for pig during the early middle ages. This could be connected to a series of factors such as new demographic trends, cultural traditions, changes in the production system for fodder (reduction in wheat) and transformation of vegetation and land use.[52] Interestingly, in mountain areas the situation seems to be different: the adaptability of cattle to cooler temperatures and the more conservative traditions would have allowed cattle transhumance and breeding to continue, flanked by a significant and continuous presence of sheep and goat.[53]

Despite the present-day common stereotype of early medieval people as enthusiastic consumers of wild boar and deer, a second interesting pattern of the early medieval Po valley faunal evidence found in food pits is the prevalence of domestic animals over the wild ones. Even if hunting was a very common practice – at least for the aristocracies – sheep, goat, chicken

[49] Castiglioni – Rottoli, 'Broomcorn millet': 140.
[50] Ravazzi *et al*., 'Lake evolution': 195-205.
[51] F. Salvadori, 'Zooarcheologia e controllo delle risorse economiche locali nel medioevo', *Post-Classical Archaeologies* 1 (2011): 195-244. For a first archaeozoological overview of the northern Italian evidence see P. Baker, *Society and Economy in Northern Italy in the Early Medieval Period (c. 8th-11th). A Zooarchaeology Study*, PhD Thesis, University College London (London 2000). On Monte Barro see Chapter 4.2.3. note 185.
[52] F. Salvadori, 'The transition from late antiquity to early Middle Ages in Italy. A zooarchaeological perspective', *Quaternary International* 499 (2019): 35-48; Id., 'Zooarcheologia': 196-198.
[53] Rottoli, 'Reflections': 25.

and the already-mentioned pig were the principal animal proteins consumed in early medieval northern Italy.[54] This prevalence is quite logical: sheep and goat allowed people to have a stable production of milk and cheese while poultry provided fresh eggs, all common elements of the early medieval diets according to the reconstructions made by both historians and archaeologists.[55]

Concerning fish sources, as described in the later chapters, one of the most problematic issues is the identification and collection of materials for proper analyses. Due to the fragility of fish-bones, fish remains have been found in only a few northern Italian sites: freshwater fish remains were found around Como lake, Monte Barro and Nogara; marine fish, on the other hand, were found at Invillino (UD) and Brescia, far from the coast.[56] Even if archaeozoology cannot provide a large sample for more detailed analysis, the presence of different species of fish in the early medieval Po valley was an important factor that conditioned not only local diets but also socio-economic patterns of these societies.[57]

In conclusion, archaeobotanical and archaeozoological data show that a great variety of plants and animal products were available to and used by men and women in early medieval northern Italy. The expansion of forest cover must be re-evaluated under a new, less-negative light, in which it is possible to identify wood and wetland as economic resources, just as cultivated fields was for the Romans. In this perspective, it might be suggested that the forests could have been maintained for specific purposes like food sources, economic income or even for natural protection against floods, as has been recently hypothesised by Michele Campopiano.[58] Demonstrating these aspects is not easy due to the lack of evidence, but considering the impact that these natural resources had on the society it is important to keep them in mind for further investigations.

[54] Salvadori, 'The transition': 37-40. P. Baker, 'A preliminary assessment of the role of hunting in Early Medieval subsistence in the Alpine, Prealpine and Lowland areas of northern Italy on the basis of zooarchaeological data', in P. Biagi – J. Nandris (eds.), *Highland Zone Exploitation in Southern Europe*, *Monografie di Natura Bresciana* 20 (1994): 307-315.
[55] K.L. Pearson, 'Nutrition and the Early-Medieval Diet', *Speculum* 72/1 (1997): 1-32.
[56] Salvadori, 'The transition': 40-43. Id., 'La pesca nel Medioevo: le evidenze della cultura materiale', *Atti del Convegno Nazionale di Archeozoologia* 6 (2012): 297–305.
[57] On fish and fishing see Chapter 4.2.3.
[58] M. Campopiano, 'The evolution of landscape and the social and political organisation of water management: the Po Valley in the Middle Ages (fifth to fourteenth centuries)', in E. Thoen *et al*. (eds.), *Landscapes or seascapes? The history of the costal environment in the North Sea area reconsidered* (Turnhout 2013): 313-332.

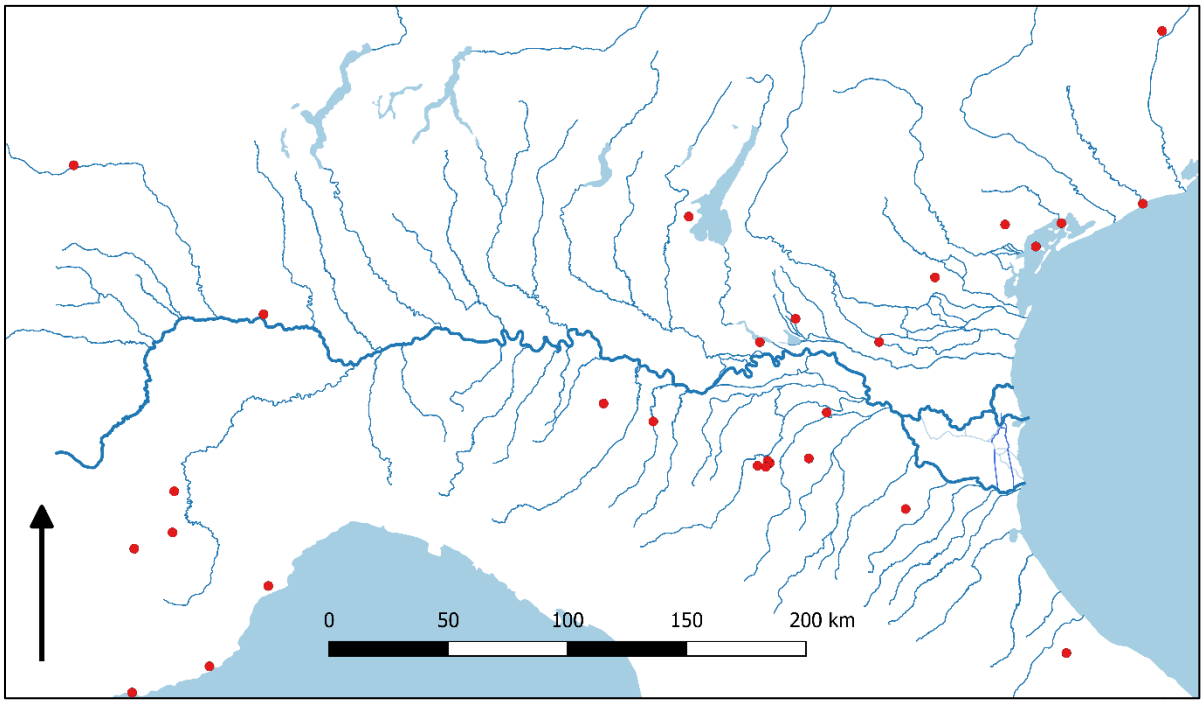


Fig. 2: Archaeobotanical and archaeozoological early medieval sites in northern Italy. After Mercuri *et al.*, 'Pollen', Fig. 2 and Tab. 1.

1.4. Early medieval climate in the Po-Venetian plain

Even if the Alpine chain is a natural climatic barrier allowing protection against northern winds, the Po valley is considered part of the continental European climatic belt. However, the presence of the natural obstacle formed by the Alps, and the relative proximity to the Adriatic Sea mean that a range of regional climatic differences have developed, like the formation of daily winds in proximity of Pre-Alpine lakes, seasonal fog and rain in the plain, and other features.

Overall, the Po valley is characterised by wet and cold winters, with recurring fogs caused by continental anticyclones between November and January, while summers are warm and humid with frequent rain. Alongside this general picture, regional differences can be seen: in the area between Cremona and Modena rainfall is limited, whereas in the northern plain precipitations are abundant and due to the humidity rising from the Adriatic sea and the western winds descending from Piedmont Alps. North of the line formed by the Po and Tanaro rivers precipitation is minimal in winter, while in the southern areas peaks of minimum precipitation are reached in summer. The Piedmont plain is characterised by maximal rainfall in spring, but in the other regions of the Po-Venetian plain the rainiest season is autumn. In addition, two sub-regions with milder temperatures can be identified around the Pre-Alpine Lombard lakes and the Adriatic lagoons.

One of the first scholars to study the history of early medieval climate in Europe and Italy was Mario Pinna, at the end of the 1980s.[59] Since then, research on this topic has made important contributions, especially in the new millennium, as a result of the increase of molecular evidence and the application of scientific techniques to written and archaeological data. In fact, the analysis of written documents alone is largely uncompleted and mostly deceptive. As Paolo Squatriti has recently argued, the recording of climatic events – frequently catastrophic and for that reason deserving of note – is not an objective picture of weather conditions of a particular time, but reflects more literary purposes, as in Paul the Deacon's description of the sixth-century floods.[60] In this case, the intention of the author was not to report climate features with an objective view, but rather to record those particular climatic events contextualising them in a biblical and classical meteorological-rhetorical culture. According to this perception, such events were a manifestation of God on Earth, a confirmation of the divine intervention.[61] In fact, the early middle ages were a period in which some people were concerned about the end of the world, and this anxiety is reflected in literary texts like in Paul the Deacon's.[62]

A scientific approach based on material evidence is necessary for a better understanding of the climatic and weather conditions of the early middle ages. A first project to link written and new scientific proxy data analyses for the Carolingian period started in 2005, coordinated by Michael McCormick.[63] The purpose was to investigate paleo-climatological data obtained through coring surveys in Greenland ice (*Greenland Ice Sheet Project Two*, GISP2) and to relate them to the climatological anomalies of the Carolingian Europe recorded in written sources. In more recent years, new proxy studies have been published investigating tree rings, glaciers and moraine surveys, solar, radiocarbon or radionuclide dating, and lake sediments records.[64]

These initial analyses indicate strong climatological instability for the eighth and ninth centuries, especially compared with the following period (the so-called *Medieval Warm Period*, MWP, lasting from about 950 to 1250). In fact – as Hanspeter Holzhauser, Michel Magny and Heinz Zambühl had discussed in their article in 2005 – the fluctuations of Great Aletsch and

[59] M. Pinna, 'Il clima nell'alto Medioevo', *Settimane* 37 (1990): 431-459.
[60] P. Squatriti, 'The Floods of 589 and Climate Change at the Beginning of the Middle Ages: An Italian Microhistory', *Speculum* 85/4 (2010): 799-826.
[61] *Ibid*.: 799-826. P.E. Dutton, 'Observations on Early Medieval Weather in General, Bloody Rain in Particular', in J.R. Davies – M. McCormick, (eds.), *The Long Morning of Medieval Europe: New Directions in Early Medieval Studies* (Aldershot 2008): 172.
[62] J. Palmer, 'Calculating Time and the End of Time in the Carolingian World, c. 740-820', *English Historical Review* 126/523 (2011): 1307-1331.
[63] M. McCormick *et al*., 'Volcanoes and the Climate Forcing of Carolingian Europe, A.D. 750-950', *Speculum* 82/4 (2007): 865-895.
[64] H. Wanner *et al*., 'Structure and origin of Holocene cold events', *Quaternary Science Reviews* 30 (2011): 3109-3123. H. Holzhauser *et al*., 'Glacier and lake-level variations in west-central Europe over the last 3500 tears', *The Holocene* 15/6 (2005): 797. See also below notes 71-74.

Gorner glaciers in the Swiss Alps show that around 750 the glacier reached its present-day extension, while in the period immediately after two advances are recorded. These variations are also attested by high-water levels in lake Petit Clairvaux around 850.[65] Similar conclusions concerning an instable period were reached by Silvia Frisia and her team which worked on stalagmite in the south-eastern Alps, reporting also that the temperature in the MWP were similar to those in 2005.[66] Two years later, the team led by McCormick also recognised instability as a main characteristic of the period, even if temperatures were higher compared to the seventh and to the final part of the tenth century, slightly anticipating the start of the MWP to the ninth century.[67]

Instability was, therefore, reconsidered as the manifestation of some cold anomalies in a generally warm period. These episodes sometimes left traces also in the written sources. The *Annales Regni Francorum* and, especially for Italy, the *Historia* of Andrew of Bergamo report anormal winters in 821-822 (when wine production was afflicted by harsh climate and many lands around rivers were flooded, compromising sowing and harvests for winter provisions), in 823-824 (when Louis the Pious had to postpone until the following autumn his campaign against the Bretons due to the impossibility of raising an army), in 855-856 and 859-860.[68] These cold anomalies do not seem, however, to reflect the main trend of winter temperatures and precipitations in the ninth century which, instead, has to be described as warmer than the previous and following periods, a situation similar to those recognised in the second and third century AD.[69]

Overall, apart from the exceptions, climate in the eighth and long ninth centuries does not seem to have had a negative influences on the societies who lived in the Po valley, despite the picture offered by the contemporary written sources.[70] Certainly, seasonal changes like precipitations or floods influenced both the life of men and women and environmental changes of the riverscape, determining good and bad harvests, shifts and creation of settlements,

[65] Holzhauser *et al*., 'Glacier': 790-796.
[66] S. Frisia *et al*., 'Climate variability in the SE Alps of Italy over the past 17000 years reconstructed from a stalagmite record', *Boreas* 34 (2005): 445-455. Similar outcomes have been recently published after Alpine tree-rings analyses in J. Luterbacher *et al*., 'European summer temperatures since Roman times', *Environmental Research Letters* 11 (2016): 1-12.
[67] McCormick *et al*., 'Volcanoes': 874-876.
[68] *AF* (800): 154; a. 824: 163-164. Andrew of Bergamo, *Historia*, 10. According to the reconstruction in D. Camuffo, 'Freezing of the Venetian Lagoon since the 9th century A.D. in comparison to the climate of western Europe and England', *Climatic Change* 10 (1987): 43-66, the Venetian Lagoon froze in 850, 853, 859, 860 and 864.
[69] C. Camenisch *et al*., 'The early Spöre Minimum – a period of extraordinary climate and socio-economic changes in Western and Central Europe', *Climate of the Past Discussions* 12/11 (2016): 1-33. U. Büntgen *et al*., '2500 Years of European Climate Variability and Human Susceptibility', *Science* 331 (2011): 578-582.
[70] The climatological situation north of the Alps especially for the second half of the eighth century seems to be characterised by slightly colder temperatures as recently examined in J.P. Devroey, *La Nature et le roi, Environnement pouvoir et société à l'âge de Charlemagne (740-820)* (Paris 2019).

migration and transport patterns. However, the impact was not dramatic and continuous but more temporary and seasonal and sometimes could have also been influenced by systematic practices of land management and anthropic impact.

From 2015, new studies were published concerning early medieval climate in Europe confirming variability as key feature, as hypothesised at the beginning of the 2000s, but focusing in particular on the possible human impact in internal climate dynamics and vice versa.[71] For example, in very recent studies after new coring surveys in the Italian-Swiss Alps at Mount Gnifetti, ice-core proxy data showed different aspects concerning atmospheric circulation patterns linked to both human and environmental factors. Thanks to ultra-high-resolution layer-counting chronology, high-resolution analysis of pollution proxies for metal production, atmospheric circulation modelling and along with the integration of archaeological and documentary records, also previous acknowledged economic trends have been reformulated. For example, the striking of silver coinage in northern Europe has been recognised already from 660, anticipating the use of this currency of almost two decades compared to what previously suggested, helping in explaining the vibrant economic networks developed around the ports of northern Europe at the end of the seventh century.[72]

Among these significant outcomes, Mount Gnifetti ice-core analyses allowed also to identify important new research paths that will possibly bring huge contributes to the historical and archaeological research of the middle ages in the next decades. In fact, the analyses showed evidence of large Saharan dust events from the late ninth and throughout the tenth century that were linked to episodes of widespread anomalous droughts in north Africa, above-average temperatures in the northern hemisphere – confirmed also by previous tree-rings analyses –[73] and, most importantly, the transport of mineral nutrients that could have had a huge impact on soil fertility that might be linked to the European agrarian revolution in correspondence of the MWP.[74] In fact, similar forms of fertilisation linked to Saharan dust events have been also recognised for the Amazon rainforest showing an interesting parallelism for the study of the medieval agriculture.[75]

Avoiding any form of geographical determinism, at the state of knowledge it is not possible to determine yet whether or not these climate and atmospheric conditions actually

[71] E. Xoplaki *et al*., 'Modelling Climate and Societal Resilience in the Eastern Mediterranean in the Last Millennium', *Human Ecology* 46 (2018): 363-379.
[72] C. Loveluck *et al*., 'Alpine ice-core evidence for the transformation of the European monetary system, AD 640–670', *Antiquity* 92/366 (2018): 1571-1585.
[73] Luterbacher *et al*., 'European summer': 1-12.
[74] H.M. Clifford *et al*., 'A 2000 year Saharan dust event proxy record from an ice core in the European Alps', *Journal of Geophysical Research: Atmospheres* 124 (2019): 1-18.
[75] H. Yu *et al*., 'The Fertilizing Role of African Dust in the Amazon Rainforest: A First Multiyear Assessment Based on CALIPSO Lidar Observations', *Geophysical Research Letters* 42 (2015): 1984-1991.

played a direct impact on socio-economic and productive trends in the Po valley or generally in Europe at the beginning of the tenth century. However, these recent encouraging studies seem to stress a close relationship between human activity and environmental and climate patterns that might be better understood and explained in the next years with the implement of proxy data collection and comparative analyses with documents and archaeological materials.

2. Roads and itineraries

In summer 810, Arsaphios, an emissary of the emperor Nicephorus I, left Constantinople for the Italian court of Pippin I, son of Charlemagne and king of the *regnum Italiae*, in Pavia. Once he had arrived at Verona, he received the unfortunate news of Pippin's death, obliging him to change his original plan. Almost at the same time as he arrived in Verona, the Byzantine emissary received a message from Charlemagne asking him to join him at his palace in Aachen to conclude the business as he did not want him to go back to Constantinople empty handed. Arsaphios, after having spent winter and spring in some of the eastern Po valley cities, joined Charlemagne at Aachen in autumn 811 before returning to the Byzantine capital.[1] Even if there are more detailed descriptions of journeys in the Carolingian period, this episode, narrated in the *Annales Regni Francorum*, is one of the many testimonies that not only documents a journey across the Po valley but also implies an itinerary crossing the Alps and – probably – sailing across the Adriatic sea, visiting different geographical and environmental localities.

Arsaphios's diplomatic mission makes important points about routes in Carolingian northern Italy. Firstly, it suggests that trade and commerce were not the only reasons for travelling. Embassies, pilgrimage, military campaigns were other motives, very frequent in written documentation, that brought people and goods onto roads in the Frankish kingdom (see Tab. 1). Because of this abundance of uses concerning roads and journeys, studying routes is very important to understand the economic, social and political patterns that relied on road systems. I consider it extremely useful to describe and to picture – with the help of maps – the possibilities of connections across northern Italy that permitted the development of social and economic networks used by different agents and institutions. Another significant reason which underlines the importance of roads is that they represent not only the connections between urban settlements in northern Italy, but also the skeleton of the human territory. In fact, following hypothetic reconstructions of the early medieval road system could help archaeological and historical research into new foundations and settlements. The principal routes could be described as a possible vehicle that facilitated the expansion of the human presence in rural areas.[2]

---

[1] *AF* (810): 133-134. For the message see *Epistola ad Nicephorum imperatoris*, Epist. Karol. II: 546-547. For a bibliography on Arsaphios and his embassy see P. Classen, *Karl der Grosse, das Papsttum und Byzanz: Die Begründung des karolingischen Kaisertums* (Sigmaringen 1985): 93.

[2] S. Patitucci-Uggeri, 'Introduzione', in Id. (ed.), *La viabilità medievale in Italia. Contributo alla carta archeologica medievale* (Florence 2003): VII-VIII.

Concerning the study of the early medieval Po valley riverscape, the analysis of movements and transport patterns allow to recognise some elements linked to the previously mentioned amphibious culture, considering that the interconnection between wet and dry areas is one of the main characteristics. For these reasons, a chapter on transport and movement patterns is crucial especially after having described the early medieval natural landscape of the Po valley that, however, might represent the ideal territory for the development of amphibious transport systems, with different features from the previous Roman/late antique and the high/late medieval environments, as argued in Chapter 1.

Looking again at the example of Arsaphios, it is possible, in fact, to distinguish two main ways in which travel could be carried on in early medieval times: the first is terrestrial, usually following the ancient Roman and late antique road system, the other is on ships and boats both across sea and rivers. These kinds of journey implied a series of difficulties: routes and roads indirectly implied many obstacles and dangers that influenced people's decisions to travel such as pirates, bandits, climatic disasters, and all the other complications a travel could include.[3] For this reason, contemporary treatises stressed the importance of good health for travellers and effective preparation for travelling, waiting for the best weather conditions and planning the most convenient itinerary to save time, money and also one's life.[4] In fact, in medieval times, consulting old Roman geographical sources such as *itineraria* or milestones (*miliaria*), was probably a common practice before embarking on long journeys.[5]

The same sources which were consulted by past travellers can be analysed by contemporary scholars to reconstruct late antique and early medieval routes. A good starting point for research on early medieval roads in northern Italy is the volume edited by Stella Patitucci-Uggeri in 2003, within the larger research program of the Italian *Carta archeologica medievale*. In the first part of the book, Patitucci-Uggeri describes which sources are available for investigating medieval roads conditions, and from this point I want to enter the discussion.[6]

Starting with the written sources, we may consider several of them which have also been used for the geographical description of northern Italy. The *Antonini Itineraria* (second century) and the *Tabula Peutingeriana* (thirteenth century) are two sources useful both for understanding geographical features and possible roads in Italian territory in late antiquity.

[3] G.I. Halfond, 'Transportation, Communication, and the Movement of Peoples in the Frankish Kingdom, ca. 500-900 C.E', *History Compass* 7/6 (2009): 1554-1555. T. Reuter, 'The Insecurity of Travel in the Early and High Middle Ages: Criminals, Victims and their Medieval and Modern Observers', in J. Nelson (ed.), *Medieval Polities and Modern Mentalities* (Cambridge 2006): 38-71.

[4] P. Horden, 'Travel Sickness: Medicine and Mobility in the Mediterranean from Antiquity to the Renaissance', in W.V. Harris (ed.), *Rethinking the Mediterranean* (Oxford 2005): 183-184.

[5] Halfond, 'Transportation': 1554-1569.

[6] S. Patitucci-Uggeri, 'La viabilità di terra e d'acqua nell'Italia medievale', in Id., *La viabilità medievale in Italia*: 1-19.

Other written sources that give information on roads are the descriptions of pilgrimage and diplomatic travels (see Tab. 1). A substantial number of these itineraries passed across the Alps, across the Po plain and the Apennines, crossing a wide area and encountering different environments. Unfortunately, looking at pilgrimage reports on Italian itineraries, the information reported in texts is not as detailed as it is for other pilgrimage routes like those for Santiago in north-western Spain.[7] However the presence of such movements confirms the use of northern Italian roads and waterways with a certain continuity throughout the early middle ages. Much information is collected in English sources such as the *Anglo-Saxon Chronicle*, Bede's *Historia ecclesiastica*, and some lives of saints like the *Vita Bonifatii* and the *Vita Alcuini*.[8] Indeed, in this case, hagiography offers much information on travels and their modalities, especially the *translatio* of relics.[9] In fact, even if they do not provide objective information – mixing natural descriptions with mystical and unnatural elements – they accurately present topographical features which help to give a general picture of the environment. Finally, other information can be found in Frankish sources such as the *Annales Regni Francorum* – as the previous example of Arsaphios confirms – the *Annales Bertiniani*, and also a range of local chronicles and histories like Paul the Deacon's *Historia Langobardorum* or the eleventh-century *Chronicon Gradense* and John the Deacon's *Chronicon Venetum* (Tab. 1).

A second fundamental source for studying road conditions in early medieval northern Italy is offered by archaeological excavations. This approach, however, is limited due to the lack of extensive studies on the whole territory, focusing instead on particular areas, mostly near urban centres. Recently, new rural settlement surveys allow us to recognise new intersection points of the early medieval communication system as in the territory south of Verona.[10]

A final method of investigation is toponymy, useful for discerning the place at which roads, bridges or ports were situated. For this reason terms like *via*, *strata* or *pons* are important for understanding previous routes of a road.[11] Similarly, names connected to the road with a clear medieval origin can also be useful for understanding the new routes of the road system like via *Francorum* or *Francisca* that later became *Francigena*.[12]

Having presented a methodological approach to study Italian early medieval roads, it is now possible to reconstruct land and water itineraries and roads active during the late Lombard and Carolingian periods, a time in which the Po valley seems to have become the prevalent

[7] On Santiago: E. Mullins, *The Pilgrimage to Santiago* (London 1974): 116-129. See also the *Codex Calistinus* edited in W. Melczer, *The Pilgrim's Guide to Santiago de Compostela* (New York 1993): 1-81.
[8] Matthews, *The Road*: 5-6. See Tab. 1.
[9] *Ibid*.: 12-17. Patitucci-Uggeri, 'La viabilità: 4.
[10] P. Basso - V. Grazioli, 'Indagini archeologiche a Gazzo Veronese lungo la strada romana nota come Claudia Augusta Padana', *Archeologia Veneta* 38 (2015): 63-79.
[11] Patitucci-Uggeri, 'La viabilità: 12-14.
[12] *Ibid*.: 13.

communication channel between Frankish Europe and the Mediterranean.[13] As mentioned above, in northern Italy – and specifically across the Po valley – different kinds of journey were possible. A simple but necessary distinction has to be made between routes by road and those on water along the Po, its tributaries and canals. This distinction is not to be considered as constituting an effective difference between the two types of travel; in fact, as has been shown, a single expedition, like Arsaphios's, could include both. However different features characterised and were peculiar to roads or watercourse journeys, concerning the ways in which it was possible to travel, the accessibility of roads as well as the variety of existing sources. For these reasons it is necessary to talk separately of land and water communication systems, but without forgetting they were part of the same system.

2.1. Land roads

Starting with terrestrial roads, an initial methodological problem emerges: is it possible to distinguish the ancient Roman roads from the new early medieval ones? This question implies that there would be a clear distinction between them but – as it will explained – it is not always so simple and possible to define the road network in such terms.

Although interest in this topic has been constant, archaeological surveys have not provided a complete reconstruction of the ancient Roman *viae publicae*. Nevertheless, consulting road descriptions in Latin authors' works, it is possible to understand the general ancient layout.[14] Most research on roads related to their construction, stations and extension was summarised in the second edition of Raymond Chevallier's *Les voies romaines*, in the late 1990s, which remain a good starting point for further analysis.[15] Moreover, in 2000, Richard Talbert edited a new exhaustive publication – the *Barrington Atlas of the Greek and Roman World* – trying to synthesis all relevant knowledge until that date, becoming a definitive tool for scholars.[16] In more recent years, the *Barrington Atlas* has been developed as a digital project – at present based at the Harvard University – in which, using the solid base provided by Talbert's atlas, it has been possible to publish a free digital atlas for the reconstruction and the study of Roman and medieval road system called the *Digital Atlas of Roman and Medieval Civilizations*

[13] See Introduction note 18.
[14] Among the most important contributions there are Strabo, Pliny the Elder and Polybius, as set out also for the geographical description of Cisalpine Gaul, see previous chapter note 1.
[15] R. Chevalier, *Les voies romaines* (Paris 1997). An English overview is in R. Laurence, *The Roads of Roman Italy: Mobility and Cultural Change* (London-New York 1999).
[16] R.J.A. Talbert (ed.), *Barrington Atlas of the Greek and Roman World* (Princeton 2000).

(DARMC).[17] With these new instruments it is easier to figure out the possible itineraries and routes that people and goods could undertake not only in Roman but also in medieval times.

In northern Italy, the construction of the Roman road system started during the second century BC after the inclusion of Gauls and Veneti that lived in the area. Especially in the territory between the Po and the Alps, pre-Roman itineraries and roads had already been part of the landscape since the Iron age (tenth-sixth century BC), which in part were re-used for the construction of the new routes.[18] The purpose of the system was to connect the numerous *municipia* – the administrative centres of the province – following the borders of the centurial rural division or cutting them by 45 degrees.[19]

The use of the *viae publicae* continued throughout the Roman and late antique periods. In the transition from late antiquity to the early middle ages a large part of the system survived, even if the political disorder did not facilitate its conservation. In fact, geomorphological and political changes caused the abandonment of some sections or entire Roman *viae* like – for example – the *via Pompilia* in the delta and eastern lagoon areas. Generally, it could be stated that the road system was maintained and, in some cases, increased in those areas around important urban centres; on the other hand, in regions where the city disappeared the road was also subject to collapse.[20] In some cases, the maintenance of the road led also to the development of new settlements as the example of Desana (VC) in Piedmont seems to suggest.[21] Here, in fact, soapstone materials from the seventh to the ninth century and a Lombard burial site testify to the presence of a settlement in proximity to the bridge crossing the Gardina stream and to the road connecting the centres of Vercelli and Trino.

Archaeological data shows differences between the early medieval road system and that of Roman times that could also have influenced transportation. In fact, early medieval reconstructions and new paths were often hardly accessible to carts and were more suitable for pedestrians or single mounted travellers using donkeys.[22] However, given the less material evidence in these kinds of itineraries and the geomorphological alterations, it is not always possible to recognise the original course and determine a proper reconstruction of roads. For this reason, other evidence is useful to identify early medieval roads. For example, an important role is played by *xenodochia*. Usually, these sites were stations at which pilgrims or other travellers could find shelter for the night and restore their strengths before continuing their

[17] Available at: http://darmc.harvard.edu/
[18] R. Knobloch, 'Il sistema stradale di età romana: genesi ed evoluzione', *Insula Fulcheria* 40 (2000): 8-29.
[19] *Ibid*.: 7-12. See also P. Tozzi, *Storia padana antica. Il territorio fra Adda e Mincio* (Milan 1972): 161-162.
[20] Patitucci-Uggeri, 'La viabilità': 22.
[21] G. Pantò, 'Settime di Desana: un insediamento altomedievale tra Vercelli e Trino', *QSAP* 17 (2000): 111-158.
[22] The use of horses in early medieval transport is mostly military. On these aspects see Patitucci-Uggeri, 'La viabilità': 5, 20-22, 27-28.

journey. Their position, sometimes far from the old Roman *viae*, may be an important indicator for the presence of secondary itineraries with an early medieval origin. At the same time, the foundation of small chapels and churches could be another sign of the development of this secondary road system, alongside the main network, as has been found especially in the central-eastern Alps in the Val di Non, the Inn Valley and the Val Venosta.[23] However, this system was not always useful as in the case of San Pietro in Valle (VR), in which the early medieval monastery does not seem to have been directly connected to any route, making the monastery itself marginalised.[24]

Another index that could help in reconstructing routes is the presence of bridges which are an important proof of a continuous use of particular roads at the end of the Roman and throughout the medieval periods.[25] Nevertheless, in early medieval times it is difficult to recognise a united system of routes like the Roman *via publica*, but the road network in the Po plain was organised without proper organic planning as regards construction or preservation, especially during the sixth and the seventh centuries.[26]

A new policy for road maintenance was only – and partially – introduced from the second half of the seventh century. During the reign of the Lombard king Liutprand, characterised by a long period of peace, the need to restore the road system led to new measures. Following this policy, damage to the road was prevented, trying to preserve the *via*, proclaiming punishments for those who damaged the pre-existing segments.[27] Chapter 150 of the *leges* of Liutprand is however the only testimony of a legal provision regarding roads for the Lombard period.

The policy of renovation of the old Roman road networks was systematically continued by the Carolingians, after their conquest of northern Italy in 774. The first action of the new rulers was taken by Pippin I in the Mantuan capitulary, which showed royal concern to reconstruct the old roads and destroyed bridges (probably damaged during the war against Desiderius).[28] According to the capitulary, it is also possible to recognise the presence in Italy of

[23] F.R. Stasolla, 'Le Alpi cerniera tra popoli e culture: le vie di lunga percorrenza', in *Carlo Magno e le Alpi: Atti del XVIII Congresso internazionale di studi sull'alto medioevo* (Spoleto 2007): 261. On the small churches foundation in this section of the Alpine chain see H. Nothdurfter, 'Chiese del VII e VIII secolo in Alto Adige', in G.P. Brogiolo (ed.), *Le chiese rurali tra VII e VIII secolo in Italia settentrionale* (Mantova 2001): 123-158. On xenodochia: T. Szabò, 'Xenodochi, ospedali e locande: forme di ospitalità ecclesiastica e commerciale nell'Italia del Medioevo (secoli VII-XIV)', in Id., *Comuni e politica stradale in Toscana e in Italia nel Medioevo* (Bologna 1992): 285-319.

[24] M. Panato, 'Rural monasteries and wilderness in Carolingian northern Italy: forest, water and ecclesiastical landscapes', in J.C. Sanchez-Pardo *et al*. (eds.), *Ecclesiastical Landscapes in Medieval Europe. A Comparative Approach* (Oxford forthcoming).

[25] Patitucci-Uggeri, 'La viabilità': 7. Pantò, 'Settime': 111-158.

[26] *Ibid*.: 1-72.

[27] *Liutprandi*, 150.

[28] Capit. I, 91/4 (782-787): «*pontes faciendum aut stratas restaurandum omnino generaliter faciant, sicut antiqua fuit consuetudo, et non anteponatur imunitas*».

people and institutions who managed their 'private roads and bridges' imposing their road system on the public one, obliging the new rulers to specify in the documents the illegality or the appropriation of these new sections. After Pippin, other two sovereigns legislated on bridges and roads: Louis the Pious in the 820s and Louis II in the 850s. While the former allowed private figures and institutions to restore and build new bridges, Louis II, in the capitulary of Pavia, recalling the old custom, decreed that the construction of bridges was the responsibility of those who lived in the nearby areas of the location in which the bridge was supposed to be settled.[29]

Considering the legislative actions that began in the reign of Liutprand and continued under the Carolingians, in the eighth- and ninth-century Po valley, the most important routes active since the Roman period were those connecting to the main urban centres like Ivrea, Vercelli, Pavia, Milan, Lodi, Piacenza, Cremona, Bergamo, Brescia, Verona, Parma, Modena, Mantua, Bologna, following the Roman *viae Augusta*, *Postumia* and *Aemilia* (Fig. 3).[30] In the eastern Po valley, around the delta area, two main land routes were partially active, even if some sections seemed to disappears after severe hydrological mutations: the *via Popilia* and the *via Romea*.[31] These *viae* along the maritime littorals, following the *Fossa Augusta*, allowed the delta to be crossed permitting south-north connection perpendicular to the natural watercourses.

The road network mostly affected by hydrological instability is that in the Venetian-Friulian plain. Even if places like Aquileia in Roman times played a central role for communication and trade in the eastern part of northern Italy and in the Adriatic Sea,[32] as a consequence of geomorphological changes and political division in those territories some routes were no longer available in early medieval times. In fact – as will be discussed later in the chapter – the majority of the written sources that report travels from the cities of Aquileia and Grado or the Istrian peninsula imply the use of ships rather than roads, preferring river and littoral itineraries between those lands and the Po valley, even in late autumn and winter when the climate conditions were not favourable to such voyages.

[29] For Louis the Pious, see Capit. I, 143/3 (820): «*si forte quilibet voluerit ex propriis facultatibus* […] *pontem emendare vel reficere* […] *emendet vel reficiat*». It is interesting that in Louis II the reconstruction is of the bridges along the Ticino (Capit. II, 211/3: «*Pontes enim, ubicumque consueti sunt, permaxime Ticinensis, restaurentur; et ubicumque non consueti necessarii sunt, construantur* […]»), but for the capitulary of Pavia see Capit. II, 213/8: «*communi opera totius populi circum habitantis ibi pons construatur*».

[30] G. Cera, *La via Postumia da Genova a Cremona* (Rome 2000). P. Tozzi, 'Viabilità di età romana fra Cremona e Brixia', in Id., *Saggi di topografi storica* (Florence 1974): 61-70.

[31] Rucco, *Comacchio*: 36. S. Patitucci-Uggeri, 'Aspetti dell'insediamento lagunare a nord di Ravenna tra Tardoantico e Medioevo', *Seminario giustinianeo* 30 (1983): 391-433

[32] S. Magnani, 'Aquileia e l'entroterra venetico e retico: alcune considerazioni', in M. Chiabà (ed.), *Miscellanea di studi dedicata a Gino Bandelli* (Trieste 2014): 243-269. For a recent resume of the studies of Roman roads in eastern northern Italy see S. Magnani, 'Viabilità e comunicazioni tra Italia settentrionale ed area alpine nell'antichità: tendenze e prospettive di ricerca', *Quaderni Friulani di Archeologia* 17 (2007): 23-43.

On the contrary, other land roads that were maintained from the Roman period or also developed new routes in the early middle ages were those connecting Alpine and Apennine mountain areas with the plain. Beginning with the routes across the Alps, it is possible to assert that although these mountains are often understood as a natural barrier that does not facilitate free movement, their chains, valleys and passes were instead already inhabited, permitting a re-evaluation of this historiographical conviction.[33] Furthermore, even though most written sources from the Roman period, describe the Alps as an inhospitable and dangerous territory, these roads are probably the most mentioned in the Frankish written documentation.[34] The crossing of every section of the Alps was almost continuous from the Roman period, even if with seasonal limitations. Particularly during winter, the passage was more difficult and sometimes impossible as testified by episodes such as in 801 – when an embassy from Baghdad was forced to spend the winter in Vercelli waiting for the good season to cross the mountains before joining Charlemagne – or in 810 – when Arsaphios had to spent the winter months in the cities of Verona, Venice and Treviso presumably awaiting better weather conditions in the Alpine passes.[35]

In the Carolingian period the political actions of the new rulers in the Alpine passes were crucial for maintaining control of the open routes especially at the *chiuse*.[36] The importance of alpine passes as communication channels is clear in the *Divisio regnorum* promulgated by Charlemagne in 806. According to the text, four Alpine passes were chosen among those which connected the three different kingdoms of Louis the Pious, Pippin and Charles the Younger, and were supposed to be always accessible for Charlemagne's heirs in case of need (Mont Cenis, Great Saint Bernard, San Bernardino/Splügen, Nassfeld?).[37] The presence of other ancient Roman roads and the combination of written and archaeological sources allow other important itineraries to be recognised like along the via Claudia, crossing the Resia and Brenner passes or along the Valtellina and Valcamonica (Fig. 3).[38]

---

[33] L. Pauli, *The Alps. Archaeology and Early History* (London 1984).

[34] For an analysis of the evolution of this historiographical *topos* until Carolingian time see F.R. Stasolla, 'Le Alpi': 253-268. The same topic is analysed also in K. Winkler, *Die Alpen im fruehmittelalter. Die Geschichte eines Raumes in den Jahren 500 bis 800* (Köln 2012): 62-113.

[35] *AF* (801): 114-116; (810): 133-134. Francesca Romana Stasolla, reporting the exemplum of the *itinerarium Burdigalense*, supports the idea that journeys across the Alps in winter were possible, but depended on the period and on the specific winter: Stasolla, 'Le Alpi': 259.

[36] On the political control of the Alps by the Carolingians see G. Albertoni, 'La politica alpina dei Carolingi', in *Carlo Magno e le Alpi*: 49-74. E. Mollo, 'Le chiuse: realtà e rappresentazioni mentali del confine alpino nel medioevo', in *Bollettino storico bibliografico subalpino* 84 (1986): 333-390.

[37] Capit. I, 45/3: (806) «[…] *ita ut Karolus et Hluduwicus viam habere possint in Italiam ad auxilium ferendum fratri suo, si ita necessitas extiterit, Karolus per vallem Augustanam, quae ad regnum eius pertinent, et Hludowicus per vallem Segusianam, Pippinus vero et exitum et ingressum per Alpes Noricas atque Curiam*».

[38] K. Winkler, *Die Alpen*: 133-143, 153-160. On the *via Claudia*'s importance in Carolingian period see G. Cantino Wataghin, 'Strade e luoghi di strada', in *Carlo Magno e le Alpi*: 269-298.

Similarly, also the southern side of the Po valley shows several routes that went to and through the Apennine chain following the natural river valleys. Looking at the *Tabula Peutingeriana* the principal routes that crossed the Apennines since the Roman period were an extension of the *via Aurelia*, linking Savona-Vado to Acqui and Tortona, and the *via Flaminia*, which at Fano met the *via Aemilia*.[39] In addition, after several surveys in Tuscany at the beginning of the 1990s a third principal route was found called the *via Cassia* – or probably better known in that period as *Cassiola* – already cited in Cicero's *Letters*.[40] This route, even if it is difficult to retrace now, was supposed to link the heart of Nonantola's abbey estates with Tuscany and the other southern territories.[41] The word *cassiola* – or the plural *cassiolae* – in the documents is still difficult to interpret. In fact, in that area many roads were defined with this name, making the route of the road difficult to reconstruct. Scholars suggest that there were multiple early medieval roads alongside the ancient 'Ciceronian' *via Cassia* that followed different paths, but that were all linked to the centres of the southern Po valley along the *via Aemilia*.[42]

Another important road for the early medieval period was the already mentioned *via Francigena* linking the Po plain's heart with the Tyrrhenian coast, crossing the Po around Piacenza, the Cisa pass and arriving at Luni.[43] The oldest written evidence for this pilgrimage route is the itinerary of Sigeric, archbishop of Canterbury who travelled in 990, providing information on the numerous stops along the road between Rome and the English Channel that offered help and assistance for pilgrims.[44]

During the first centuries of the early middle ages, other secondary Apennine roads also played a crucial role in the conflict between Lombards and Byzantines.[45] In particular, among the most used secondary routes there were those along the Reno and Panaro valleys, carrying the road that linked Bologna and Pistoia, the Lamone valley, connecting Faenza and Florence, the Montone valley, between Forlì and Florence, the Savio valley, in which the route was

[39] E. Weber, *Tabula Peutingeriana. Codex Vindobonensis 324* (Gratz 1976).
[40] W. Kurze, 'Le comunicazioni fra Nord e Centro Italia nel Medioevo', in P. Foschi *et al*. (eds.), *La viabilità appenninica dall'Età Antica ad oggi* (Porretta Terme-Pistoia 1998): 17-28.
[41] P. Foschi, 'La medievale via *Cassiola'*, in Id. *et al*. (eds.), *La viabilità*: 79-100.
[42] See the bibliography in *Ibid*.: 98.
[43] On the sizeable historical and archaeological debate about the *via Francigena* see the recent publication S. Patitucci-Uggeri (ed.), *La via Francigena e altre strade della Toscana medievale* (Florence 2004). See also P.L. Dall'Aglio¸ 'Viabilità romana e viabilità altomedievale: continuità e discontinuità. La via Francigena da Piacenza a Lucca', in Patitucci-Uggeri (ed.), *La viabilità*: 73-88, and W. Kurze, 'La "via Francigena" nel periodo longobardo', *De strata Francigena* 6/1 (1998): 29-37.
[44] V. Ortenberg, 'Archbishop Sigeric's Pilgrimage to Rome in 990', *Anglo-Saxon England* 19 (1990): 197-246. Matthews, *The Road*: 4.
[45] Paul the Deacon provides information about strategic attacks through the Apennines in Byzantine territories in Tuscany, as in Grimoald's campaigns, *HL*, V/27. On the Lombards in this section of the Apennines see Kurze, 'Le comunicazioni': 21-27, R. Zagnoni, 'La montagna fra Bologna e Pistoia dall'Alto Medioevo al secolo XI', in Id. (ed.), *La montagna fra Bologna e Pistoia fra Età antica e alto Medioevo* (Porretta Terme 1999): 39-44.

between Cesena and Arezzo, and the Marecchia valley, between Rimini and Arezzo. Finally, the road in the high Secchia valley through Garfagnana linked Modena with the Lucchesia region and Pistoia, following some sections of the Roman *via Clodia*.[46] The multiplicity of those routes confirms the fact that also the Apennines were not a real barrier for movements and communication, allowing a continuous passage of people and goods in every season of the year.

Overall, it may be asserted that the structure of the great Italian *viae publicae* at the end of the Roman period seemed mainly preserved in the following centuries, with exceptions in those territories in which geomorphological degradation was significant, as in some sections of the *via Aurelia*, *Postumia* and *Pompilia*. The creation of the important pilgrimage roads linking together different sections of the previous system, like the *via Francigena*, is the most evident sign of continuity throughout the late antique and medieval times, despite the fluctuating state of conflict that characterised different territories in northern Italy. The analysis of these roads shows that the early medieval road system cannot be considered as a completely new phenomenon compared to the previous Roman situation. On the contrary, continuity characterised those paths and roads, even if differences are evident.

2.2. Water itineraries

Historiography has often focused in the past more on land routes, whereas especially for the medieval Po plain the significance of waterways has been recorded in much written documentation.[47] As Roberto Greci has shown in a recent article, the reasons why land itineraries were preferred were mainly two: firstly, it was generally assumed that during the middle ages there was a change between a river tradition of mobility in early medieval centuries followed by a progressive growth in land routes in the late medieval period, favourited by more stable political structures and economic networks. Secondly, the lack of material evidence linked to movements and transports on river and lagoon areas of this period did not allow the development of a debate on these themes as instead happened for northern European areas.[48]

However, even if studies on river routes and communication systems have apparently been subject of less attention than the terrestrial ones, a significant literature has developed in the second half of the last century concerning the river navigation in the Po valley.[49] After a first analysis on the Po valley trade written at the beginning of the last century by Ludo Moritz

[46] For more detailed descriptions of these roads see G. Bottazzi, 'Le comunicazioni antiche fra il Modenese e la Toscana in età romana e nel medioevo', in Foschi *et al*. (eds.), *La viabilità*: 47-78.
[47] Matthews, *The Road*: 19-22.
[48] R. Greci, 'Porti fluviali e ponti in età medievale. Il Po e l'area padana', *HAM* 22 (2016): 238-248.
[49] Chapter 4 note 2, 8. For an exhaustive bibliography see Patitucci-Uggeri, 'La viabilità': 15.

Hartmann, other important contributions were published in the 1950s and 1960s by Carlo Guido Mor, Cinzio Violante, Gian Piero Bognetti, and especially Gina Fasoli.[50]

After these initial studies, research on navigation in the early medieval Po valley was neglected due to a general lack of documentary and archaeological sources which limited subsequent the following studies to the reconstruction of the economic networks of single monasteries, churches and institutions rather than to the investigation of the actual forms of navigation and their material and social patterns. In a larger European perspective, research on inland and river navigation has gradually increased in more recent years focusing on the French and German river valleys. Initial studies – first initially conducted by Jean-Pierre Devroey – were mainly centred on written documentation (polyptychs and diplomas) preserved by available for the great ecclesiastical institutions like Saint-Germain-des-Prés and Prüm, at the heart of Frankish Europe, allowing to retrace aspects of the river transport and navigation patterns on the Rhine, Moselle, Seine, Loire and even Rhône valleys.[51]

With the increase of archaeological surveys, excavations, analysis and their gradual and systematic publication in the last thirty-four years, summed to the analysis of the large documentary collections brought in more recent years to develop new outcome concerning inland navigation and transport patterns presenting overview not only on the economic circuits that had a river corridor as main communication channel, but also on the material forms of the structures like harbours, vessels and canals.

This new research has found important contributions since June 2012 in Germany, after the launch of an extended research program titled *Häfen von der Römischen Kaiserzeit bis zum Mittelalter* (Harbours from the Roman Period to the Middle Ages). Among the several subproject, a combined research between history, archaeology and geomorphology has been focused on the inland navigation between 500 to 1250 (*Studien zu den Binnenhäfen in Zentraleuropa als Knotenpunkte europäischer Kommunikationsnetzwerke*) with the purpose of analysing in dept the role of rivers as communication channel in the medieval period, its structures and tools.[52] In 2018 the most interesting research output was the publication of a digital database concerning all the material evidence linked to river navigation, as ports, wrecks and ferries, recognising water routes and specific clusters all over medieval Europe.[53] This

[50] L.M. Hartmann, *Zur Wirtschaftsgeschichte Italiens im frühen Mittelalter* (Gotha1904); C.G. Mor, *L'età feudale II* (Milan 1952): 355 and followers; C. Violante, *La società milanese*; G.P. Bognetti, 'La navigazione Padana e il sopravvivere della civiltà antica', *Archivio storico lombardo* 89 (1962): 5-16; G. Fasoli, 'Navigazione fluviale. Porti e navi sul Po', *Settimane* 25 (1978): 565-607.

[51] Devroey, 'Les services: 543-569. Id., 'Un monastère': 570-589. Id., 'Courants et réseaux d'échange dans l'économie franque entre Loire et Rhin', *Settimane* 40 (1993): 327-393. For the Rhône valley networks see Panato, *Il Rodano*: 33-82.

[52] http://www.spp-haefen.de/de/die-projekte/binnenhaefen-in-zentraleuropa/

[53] http://haefen.i3mainz.hs-mainz.de/

project interested also part of the Po valley even if the main research was conducted on German and French case studies.

In Italy a first workshop in which it was possible to experiment similar research approaches, mixing documentary sources and material evidence has been developed since the 1990s in the delta area around the centre of Comacchio.[54] However, even if important considerations have been formulated on general navigation patterns, the environment of the delta cannot be entirely associated to a river environment and riverscape.[55] In fact, here, watercourses, marshes and sea gave birth to a particular landscape without direct correspondent in the Po valley hinterland, preserving an autonomy shared, in case, with other coastal and lagoon centres like in the Venetian lagoon or, partially, in the territory of Grado.[56]

Considering proper riverscapes, similar works have been recently conducted along the Volturno in southern Italy, especially thanks to the materials from the rich archaeological park of the abbey of San Vincenzo. Here historians and archaeologists worked together trying to explain how navigation patterns linked to the monastery and its economic network developed, presenting hypothetical reconstructions of structures and networks.[57]

For the Po valley some considerations on navigation patters could be formulated looking at the same interdisciplinary approach between written and archaeological sources. Already in the Roman period, in fact, the Po was considered the main channel for the inland navigation as far as Turin, around which an entire work of canalisation was built, permitting the creation of a system linked to the road in the most important centres of the plain.[58] Strabo attests, the existence of a regular transport service between Piacenza and Ravenna in the first century AD, a journey of two days and two nights, and also in the later period – at the beginning of the sixth century – Cassiodorus reports that navigation was still active between Pavia and Ravenna as the five-day journey on the Po by a group of Heruli should suggest.[59] The principal scope of this system based on the so-called *collegia* – corporations of sailors operating on specific section of rivers and watercourses, like those operation on the lakes of Como and Garda or along the Ticino, the Mincio and the Tartaro rivers – was to connect the different administrative and

[54] F. Berti *et al*. (eds.), *Genti nel delta da Spina a Comacchio. Uomini, territorio e culto dall'Antichità all'Alto Medioevo* (Ferrara 2007).
[55] Rucco, *Comacchio*: 27-38.
[56] S. Gelichi *et al*., 'Venezia e la laguna tra IX e X secolo: strutture materiali, insediamenti, economie', S. Gelichi – S. Gasparri (eds.), *The Age of Affirmation: Venice, the Adriatic and the Hinterland between the 9th and 10th Centuries* (Turnhout 2017): 79-128.
[57] F. Marazzi – A. Frisetti, 'Porti 'monastici' in Campania fra VIII e X secolo', *HAM* 22 (2016): 227-237.
[58] For the written sources on Po valley navigation in Roman times see Pliny the Elder, *Naturalis Historia*, III, 123, which reports the navigability of the Po until Turin, Polybius Histories, II, 16-10, which reports the navigation until 2.000 stadia from the mouth (approximately until the confluence with the Tanaro river). Patitucci-Uggeri, 'La viabilità': 15-16.
[59] Strabo, *Geographica*, V/1: 11. Cassiodorus, *Variae*, IV: 45.

economic centres like cities and rural estates of the Cisalpine Gaul, and to facilitate the transport of both heavy goods like marble, bricks and wood and lighter products like wine and salt.[60] Already in the first centuries of the first millennium AD water itineraries played a vital role for the economy and the society of the Po valley deeply linked to the efficient road system.

In early medieval time, because of the lack of maintenance of roads and the increase of watery environments, waterways gained a primary function in communication and transport, as recent scholarship tends to describe: these journeys were safer, cheaper, and advantageous for the transport of heavy and large products compared to land routes.[61] Detailed reports of journeys on rivers in the Po valley, however, are not very numerous for this period. First examples in the narrative sources are from the tenth century: the first is the narration of the translation of St Sinesius and St Theopompus's relics from Treviso to the abbey of Nonantola in 911; the second is the travel of Otto I between Pavia and Ravenna in 963; and a third significant testimony of river navigation is the three-day journey from Pavia to Venice of Liutprand bishop of Cremona in 969.[62] These texts, however, do not provide precise account on the route, reporting information on stations, ferries and means of transport. one of the most useful documents in this sense is the so-called Capitulary of Liutprand, a *pactum* made in the early-eighth century by the Lombard kind for regulating the salt trade from Comacchio.[63]

The Capitulary allows several analyses concerning the type of goods that were travelling on water, the economic regulation of these trade and, especially in this case, the toll stations and ports in which the people from the delta had to pay taxes for their *transitum* and activity, including the *portus Mantuanus*, *Capo Mincio*, *portus Brixianus*, *portus qui vocatur Cremona*, *portus qui appellatur Parmisiano*, *portus quid dicitur ad Addua*, *portus quid dicitur Lambro*, and *Placentia* (Fig. 3).[64] According to the Capitulary, the terminals of the river navigation were mainly cities, but also rural ports and bridges could be considered key areas for connections with the road system as will be explained in the next chapter. It is reductive to identify this communication network as a prerogative of urban centres. In fact, the reports of journeys crossing the Po valley implies the use of both land and water itineraries and means of transport. Even if some historians argue for the key role of navigation on rivers rather than roads in the early middle ages, it is not possible to talk about one system without including the other.[65]

---

[60] G. Uggeri, 'La navigazione interna della cisalpina in età romana', "*Antichità Altoadriatiche* 29/2 (1987): 305-354.

[61] Halfond, 'Transportation': 1557-1558. S. Lebecq, *Marchands et navigateurs frisons du haut Moyen Age, I* (Lille 1983): 187-93.

[62] *Translatio et miracula sanctorum Senesii et Theopontii*, in *SS* 30/2: 984-992. Liutprand of Cremona, *Historia Ottonis*, *SS* 3: 741. Id., *Antapodosis*, VI/4.

[63] *Constitutio Liuthprandi regis*, in V. Leoni (ed.), *Privilegia episcopii Cremonensis o Codice di Siccardo (715/730 - 1331)*, CDLM, 2.

[64] For an overall analysis of the document see Fasoli, 'Navigazione', 565-607.

[65] Halfond, 'Transportation': 1557; McCormick, *Origins*: 64.

What emerges from these sources is that in the early middle ages several primary and secondary watercourses were navigable. The increase of wetland and the spread of marches could have increased the possibility of navigation in the Po valley in both direction – testified since the Roman period –[66] and during a longer period of the year. According to the season and the volume of precipitation and changes in temperatures it was possible to see a frequent up and down stream circulation of men, boats and goods. Undertaking such journeys implies a certain number of inconveniences for travellers. To avoid natural obstacles and foresee possible dangers, especially during night navigations, helmsmen and river sailors must have great experience and knowledge of the rivers and surrounding environments, allowing them to adapt to every situation and difficulty. Particularly for river trips, it would be possible to follow different techniques of sailing. First of all, natural currents were helpful for river travels downstream. Wind – especially in the delta area – was another fundamental motor, which reduced the sailor labour, even if paddling was possible for river navigation. In addition, another common method for transportation of boats was using human and animal traction (*alzaia* method), pulling them with rows secured to the mast, a technique testified since the Roman period until the last century along the Po.[67]

All these travels should have been based on a system of docks, ferries, and ports that could have been inherited since the roman period but possibly developed in the following centuries as the Carolingian laws seems to suggests, ordering a reduction of the legal structures along the water of the kingdom and confirming the role of these ports as point of control of the movements – and trade – on water.[68]

The reconstruction of such a system and the identification of its centres is, however, complicate, even if some aspects can be hypothesised looking at both written and archaeological evidence (Fig. 3). One of the main problems is the high perishability of main material used both in urban and rural contexts for these constructions (wood) and its fluctuation according to seasonal floods and mutation of the riverbed, as evident in some rural sites in Emilia.[69] A second issue is the ambiguity of the terminology used in written documents itself not allowing a clear recognition of specific navigation structures in the riverscape. For example, the term *portus* itself does not always mean a series of structures dedicated to boat moorage, storage of goods and

[66] S. Medas, 'La navigazione lungo le idrovie padane in epoca romana', in G. Cantoini – A. Capurso (eds.), *On the road. Via Emilia 187 AC – 2017* (Parma 2017): 146-163.
[67] *Ibid*.: 146-163. Fasoli, 'Navigazione': 578.
[68] Capit. I/94, 9 (787): «*Consideravimus, ut vias et portoras vel pontes infra regnum nostrum in omnibus pleniter emendate esse debeant per illa loca ubi antea semper fuerunt; nam per alia loca super ipsa flumina nullatenus portoras esse debeant*». Capit. II, 211/3 (850): «[…] *Navigia in consuetis locis preparata consistent, et ne transuentes gravent, commonendi sunt*».
[69] P. Galetti (ed.), *Civiltà del legno: per una storia del legno come materia per costruire dall'antichità ad oggi* (Bologna 2004). See Chapter 3.

boat repairing. In fact, sometimes, especially in river environments, written documents talk about *porti* specifying points along the watercourse at which there were ferries to cross the river or boat bridges, as archaeological research has shown in the cases of the Rhine and Danube valleys.[70] This scenario complicates the identification of such points on the map but, concurrently, underlines the interconnection between river and road networks enlarging research perspectives.

The same lexical problem is valid not only for navigation infrastructures but also for the means of transports like boats and ships. In fact, even if royal documents and laws mainly report the term *navis* (Tab. 2), it is highly improbable that this term refers to a single type of vessels. Archaeological finds in this case allow some considerations, confronting together materials from northern Italy and central-northern Europe.[71] A first distinction is evident between maritime and river vessels. Particularly for northern Italy, archaeological excavations in Comacchio in the 1980s brought to light a 20 metres long cargo ship from the late antiquity, used in maritime navigation in the Adriatic and eastern Mediterranean as the rescued oil and wine amphorae of the cargo show.[72] As shown since the first analyses, the characteristics of the ship make impossible a navigation in inland waters for this large ship. It is possible, therefore, that in these hybrid lagoon areas like Comacchio and Venice, between the land and sea, a change of vessel was actuated making a separation between the two types of navigation.

According to archaeological evidence of the Po valley, the most common river vessel is log-boat (Fig. 4). Log-boats and pirogues are recorded in Europe since the Mesolithic, but in the last decades a certain amount of vessels has been discovered and dated between sixth and eleventh centuries: from the Po main course, at least six log-boats have been recognised in the section between Pavia and Reggio Emilia, while other similar wrecks have been found in Veneto rivers and along the Adriatic coast.[73] These log-boats are between 6 and 8 metres in length, with a very rudimental hull, showing very basic construction techniques. These characteristics differs a little from the description given by Gina Fasoli of the vessels, based on the cargo capacity reported in the Capitulary of Liutprand on the salt trade between Comacchio and the Po valley centres in the eighth century, attributing a length of 15 metres from poop to prow, 2.5 metres

[70] Greci, 'Porti': 238. L. Werther – L. Kröger, 'Medieval inland navigation and the shifting fluvial landscape between Rhine and Danube (Germany)', *PCA* 7 (2017): 65-96. See Chapter 3.

[71] L. Kröger, 'Les bateaux fluviaux médiévaux sur le Main et le Neckar. Les bacs comme composantes d'un paysage culturel fluvial', in É. Peytremann (ed.), *Des Fleuves et des Hommes à l'époque mérovingienne. Territoire fluvial et société au premier Moyen Âge (Ve-XIIe siècle)* (Dijon 2016): 89-104. É. Rieth, *Des Bateaux et des Fleuves. Archéologie de la batellerie du Néolithique aux Temps modernes en France* (Paris 1998).

[72] C. Meucci – F. Berti, *Schede di archeologia dell'Emilia-Romagna. La nave di Comacchio: documenti di un restauro* (Bologna 1997).

[73] N. Martinelli, 'Datazione assoluta di imbarcazioni monossili dell'Italia settentrionale', *Navis* 4 (2010): 315-318.

wide midship, with a height (comprehensively below and above the waterline) of around 1.5 metres without the mast – which could be removed in proximity of bridges or when docked.[74] Finally a third type of vessel – that, however, does not find any archaeological reference in northern Italy – is coracle (*carabus*), made of wicker and leather, used in the Roman period in the Po valley and in Britannia as Lucan and Isidore describe.[75] Unfortunately these reconstructions are mostly hypothesised – with the exception of log-boats, documented also in other regions of Europe for this period – due to the perishability and reuse of materials that have not permitted their conservation.[76]

At the end of the early middle ages, water travels were therefore an important aspect of everyday life involving different structures, agents and means of transport. Nevertheless, the archaeological scenario available does not allow to identify precisely where the principal points of this system were and how they were structured. For the moment, basing on solid information from written evidence, it is possible to formulate hypothesis, and identify on the map the most probable points in which ports, docks, bridges and toll stations – partially inherited from the old Roman system and partially following the new geomorphological and socio/political needs – were probably located (Fig. 3), conditioning the riverscape, its environment and its society.

2.3. The development of a system

Movement in northern Italy – as recognised in the rest of early medieval Europe –[77] was one of the characteristic patterns of the contemporary societies and, despite the dangers of both land and water itineraries, was done in particular along the river valleys, both perpendicularly along the river course and transversally. The early medieval geoenvironmental features described in Chapter 1 should also suggest an extension of the water itineraries and a contraction of the road system especially in proximity of wetland. The river was in this sense a universal factor, conditioning not only the people who lived and worked in its proximity but also those who – for whatever reason – decided to travel.

After having acknowledged the possible roads and itineraries in the early medieval northern Italy, the first point to make is that the communication networks of land and water were connected, and both could have been used in the same journey, not much differently from what was supposed to happen in the previous Roman system, representing a fundamental

[74] Fasoli, 'Navigazione': 589-590.
[75] Lucan, *Pharsalia*, IV: 131-135. Isidore of Seville, *Etymologiae*, XIX/I: 25-26. Greci, 'Porti': 239.
[76] On the reuse as fuel see Fasoli, 'Navigazione': 577. For an overview on European log-boat wrecks with their bibliography: http://haefen.i3mainz.hs-mainz.de/
[77] Halfond, 'Transportation': 1554-1569.

pattern of amphibious culture. This system should therefore imply the presence in the territory of different structures that should have had a primary role for transport and movement patterns., like the formation of junction points in which the two types of itineraries could have been linked, offering perhaps shelter, possibility of supply and repair and control by the kingdom agents. These points could have been located both in urban and rural areas and could have contributed to the formation and development of old and new settlements, as will be explore in the next chapter.

Particularly for water itineraries other important structures – only partially inherited from the Roman period – were ditches and canals that often are named in the texts, and that might represent one of the most significant medieval patterns considering the progressive spread that these works had especially from the eighth century onwards and especially in the high medieval period.[78] In fact, paradoxically, the few archaeological finds linked to inland navigation, especially log-boat wrecks, suggest a large use of these secondary watercourses since the pre-Roman period. This trend is partially confirmed also in later cases emerging from the documents like in the high medieval transport system linked to the monastery of San Silvestro of Nonantola. Between the tenth and the twelfth centuries, in fact, the monks extended their control over the artificial and natural watercourses in Emilia between Bondeno (FE) and Reggio, confirming the primary role of inland navigation for the development of the *Stato Nonantolano*, as Bruno Andreolli highlighted.[79]

It is possible, therefore, to recognise a general continuity of a transport system along rivers and watercourses for the entire first millennium AD with possible brakes during the crises especially between the sixth and the seventh centuries. However, the main difference between the early medieval and the Roman transport and movement system in the Po valley, apart from the different environmental features seen in the first chapter, is visible in their respective administrative patterns. If for the Roman period the central administration was crucial in the creation of both structures – like roads and ports – and the socio-economic network itself, in the early medieval period and in particular between the eighth and the early tenth century the presence of different agents contributed to the creation of a more complex and multifaced system. The monasteries like San Silvestro, for example, seem to become new effective administration centres also in terms of road maintenance and river transport administration. Even if both Lombard and Carolingian kings took care of the transport system in northern Italy,

[78] On canals see Chapter 3.2.3. and Tab 3.

[79] M. Calzolari, 'Navigazione interna, porti e navi nella pianura reggiana e modenese (secoli IX-XII)', in G. Bertuzzi (ed.), *Viabilità antica e medievale nel territorio modenese e reggiano. Contributi di studio*, (Modena 1983): 124-132. B. Andreolli, 'Il sistema curtense nonantolano e il regime delle acque', in F. Serafini – A. Manicardi (eds.), *Il sistema fluviale Scoltenna-Panaro: storie d'acque e di uomini. Atti del convegno, Nonantola 10-12 marzo 1988* (Nonantola 1988): 91-94.

their constant legislation against the construction of new ports and bridges might be seen as a reflection of much more dynamic contexts in the localities,[80] linked perhaps to local powers and circumscribed territories that unfortunately do not have a clear voice in the documents. Similarly, also archaeological finds at the moment do not allow to better analyse these complex dynamics obliging us to look also at other aspects of the early medieval Po valley in order to figurate a more complete picture and possibly to understand how the new centres of power, from the kings to the local lords, influenced the socio-economic life of these territories.[81]

To conclude this part on what has been define as the "skeleton of the human territory", even if it is not possible to precisely reconstruct the entire movement and transport system (or systems), it is undoubted that these arterial, land and water routes were the axes on which early medieval people developed their socio-economic networks, as will be investigated in Chapter 4. However, before exploring the complexity of these networks it is now crucial to understand what kind of structures and junction points characterised the Po valley riverscape in both urban and rural areas in the forms of settlements and waterfront structures, and how they were connected to the river itself and its networks.

[80] On the Lombard and Carolingian law see above note 28, 29, 30.
[81] On these aspects see also Chapter 4 and the Conclusions.

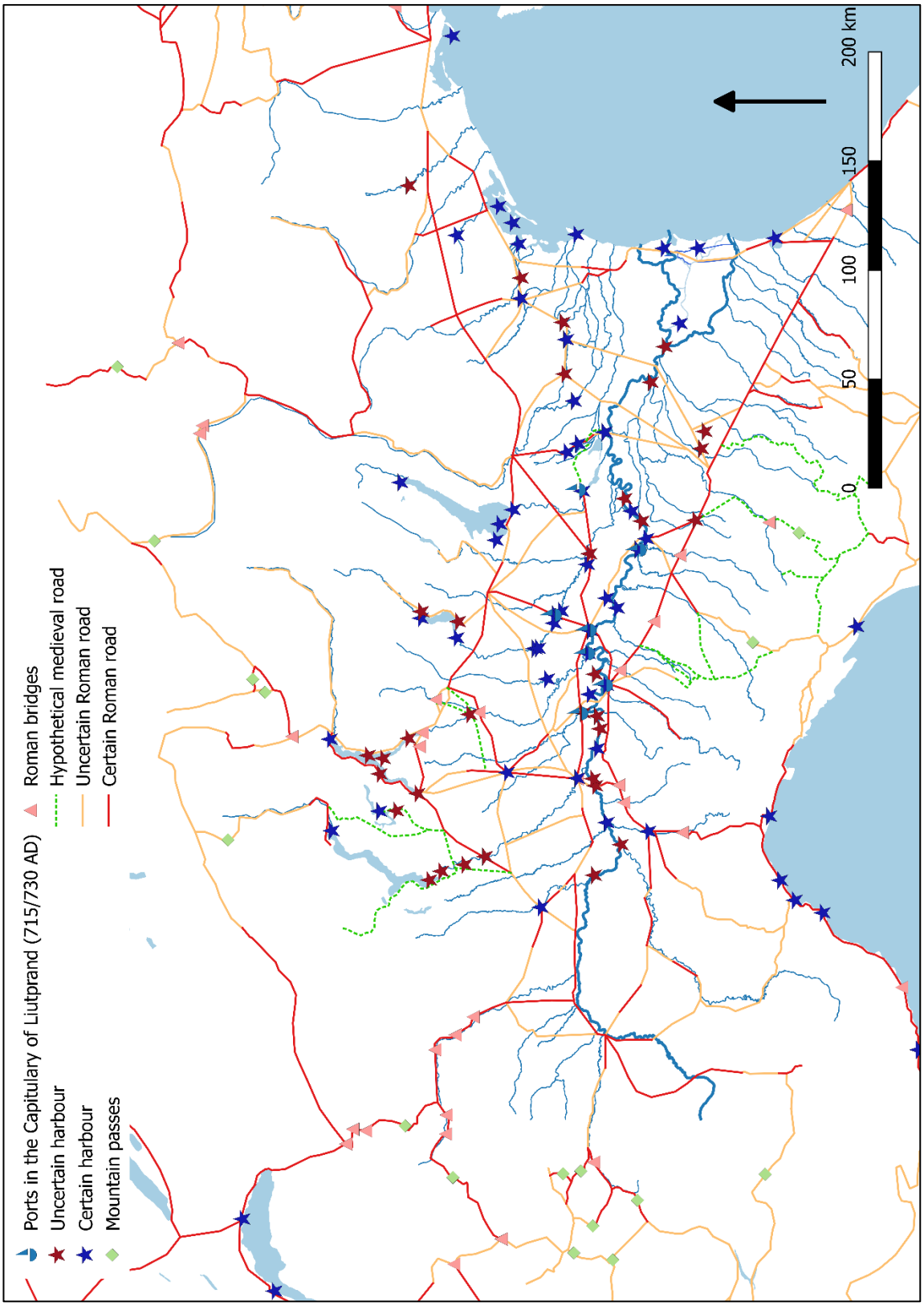


Fig. 3: Roads and ports of early medieval northern Italy

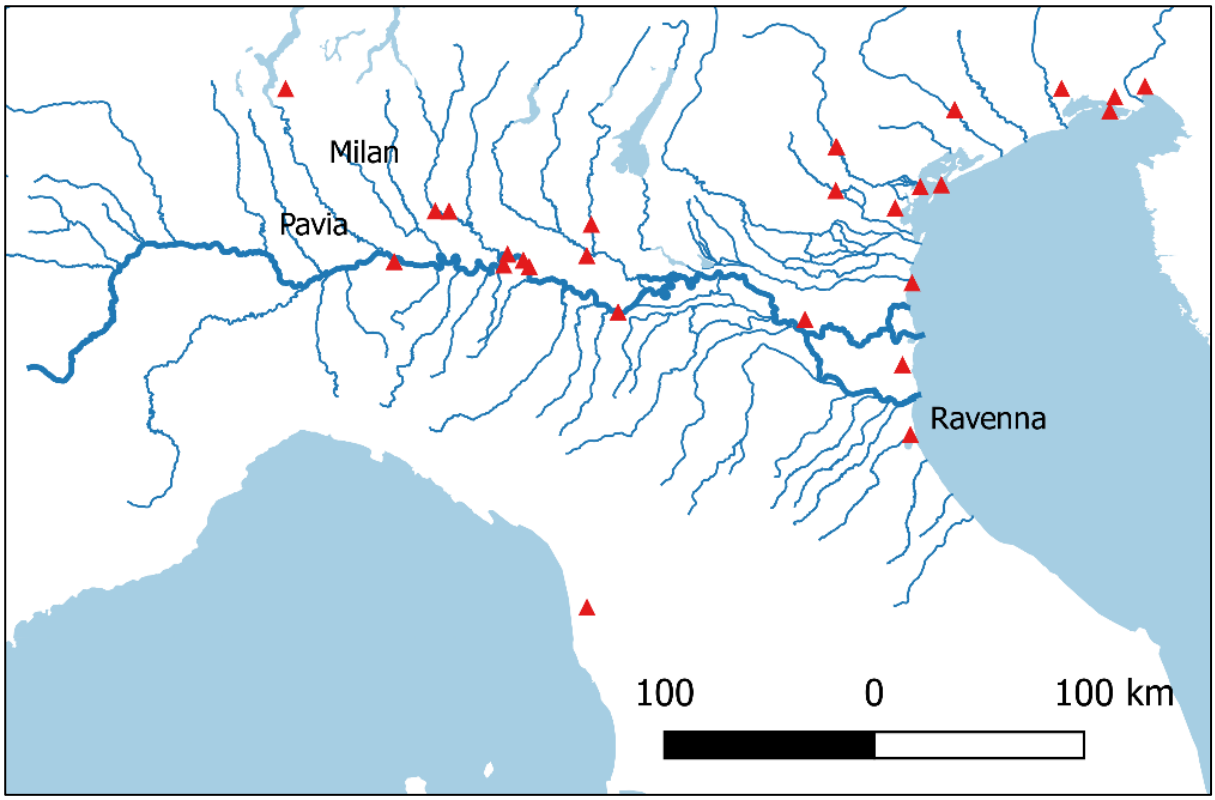


Fig. 4: Log-boat wreks in northern Italy (6th-11th centuries). Elaboration from http://haefen.i3mainz.hs-mainz.de/

3. River and wetland settlement patterns

The relationship between settlements and rivers has always been considered a core element in several research fields. The polyvalent role that watercourses assumed in archaeological and historical research contributed to stimulate the attention to this topic in previous works and scholars. Firstly, the economic meaning of rivers linked to production and trade networks was considered – as will be in Chapter 4 – followed by topographical aspects linked to the settlement distribution itself, or other more cultural patterns linked to the ways in which societies engaged with rivers. All these aspects contributed to the understanding of the interplay between human activity and water, promoting the idea that this link was everywhere and in every case a vehicle for the whole spectrum of functions and roles that the river implied.[1]

In the last 20 years historical and archaeological works covered all these aspects, developing and increasing the use of other disciplines – like for example geomorphology and archaeobotany – that nowadays are crucial in the reconstruction of historical landscape and beyond. The influence of waterfront archaeology was also fundamental in increasing interest and enlarging the possibility of studying the human presence near watercourses with all its implications.[2]

There were a limited number of studies concerning the relationship between rivers, wetlands, and urban and rural settlements in northern Italy and most have been conducted on coastal and delta settlements. These settlements, however, cannot be considered representative of the entire Po river valley as they have different environmental and socio-economic characteristics.[3]

The instability of river environments – highlighted in the first chapter – seems, however, to force human presence to adapt in order to survive. The mistake in this case could be to not consider the possibility that the river-based societies adapted to their environment becoming exploiters of the woodland and marshes and not passive victims of environmental processes.

---

[1] F. Saggioro – G.M. Varanini, 'Insediamento umano, terre e acque nella pianura veronese', in D. Canzian – R. Simonetti (ed.), *Acque e territorio nel Veneto medievale* (Bologna 2012): 95.

[2] R. Van de Noort, 'The Archaeology of Wetland Landscapes: Method and Theory at the Beginning of the 21st Century', in B. David – J. Thomas (eds.), *Handbook of Landscape Archaeology* (New York 2008): 482-489.

[3] See the cases of Comacchio and Venetian lagoon for northern Italy, S. Gelichi, 'Tra Comacchio e Venezia Economia, società e insediamenti nell'arco nord adriatico durante l'Alto Medioevo', in Berti *et al*. (eds.), *Genti nel delta*: 365-386. On the differences between coast and inland settlement see the example in northern Europe in C. Loveluck, 'The dynamics of portable wealth, social status and competition in the ports, coastal zones and river corridors of northwest Europe, c. AD 650-1100', in V. Loré *et al*. (eds.), *Acquérir, prélever, contrôler: les ressources en compétition (400-1100)* (Turnhout 2017): 299-322.

This change of perspective for medieval inhabitants is not easy to identify by scholars. In fact, what emerges from the majority of written and archaeological sources is that entire settlements had to change location or undertake construction work in order to save themselves and their economic resources, a problem more evident in rural areas but also with some examples in cities, such as Modena.[4]

In this section of the thesis, the settlement patterns of the eighth, the ninth and the early-tenth centuries in the Po valley will be analysed using both historical and archaeological approaches and focusing on their relationship with river wetland areas. The aim is therefore to retrace the main sites and characteristics of the settlements linked to the inland water and river network, highlighting the peculiarity of the river environment in the development of specific settlements – as Riccardo Rao has partially demonstrated for the medieval Sesia riverscape –[5] and understanding the extent to which it may be possible to apply the concept of amphibious culture to this area, taking account of both urban and rural contexts, and understanding the link between rivers and settlements.

3.1. City and river

The city has always been a crucial topic for scholars who study early medieval northern Italy. In this area, compared to the rest of Europe, some sort of 'urban tradition' was still alive, even if between the sixth and the ninth century almost one third of those cities of Roman origins disappeared.[6] Nevertheless, northern Italy and therefore the Po valley are considered by both historians and archaeologists to be a 'land of cities', as Enrico Cirelli has recently termed it.[7] This description, however, cannot be applied to every northern Italian territory due to a substantial lack of both written and archaeological evidence, as in the case of Piedmont, not allowing for a inclusion of these areas in the general picture.[8]

Many features have been suggested to define early medieval cities and – of course – these criteria have not always been agreed collectively by the whole academic community.

[4] Bosi *et al.*, 'A survey': 3-23.
[5] R. Rao, 'Abitare, costruire e gestire uno spazio fluviale: signori, villaggi e beni comuni lungo la Sesia tra medioevo ed età moderna', in Id. (ed.), *I paesaggi*: 13-30.
[6] B. Ward-Perkins, 'The towns of northern Italy: rebirth or renewal?', in R. Hodges – B. Hobleys (eds.), *The rebirth of towns in the West* (London 1988): 16. A more recent overview for the Po valley is in M. Pearce, 'Le città fallite. Considerazioni sulla robustezza delle istituzioni cittadine', *Athenaeum* 95/2 (2007): 815-818.
[7] E. Cirelli, 'Le città dell'Italia del nord nell'epoca dei re (888-962 AD)', in M. Valenti – C. Wickham (eds.), *Italy, 888-962: a turning point* (Turnhout 2013): 131.
[8] On Piedmont cities situation see C. La Rocca, 'Fuit civitatis prisco in tempore. Trasformazioni dei municipia abbandonati dell'Italia occidentale nel secolo XI', *Segusium* 29 (1992): 238-278, and E. Micheletto 'Chiese e città romane abbandonate: alcuni esempi in Piemonte', in G.P. Brogiolo (ed.), *Chiese e insediamenti nelle campagne tra V e VI secolo* (Mantova, 2003): 109-118.

There are two principal reasons why it is hard to identify widely accepted features: on the one hand, the variability that characterised the early middle ages is also reflected in the formation of urban centres, complicating the scenario and not allowing for simplistic generalisations; secondly, the definition of city proposed by each scholar was, therefore, useful for a particular case and could not perhaps be applied to other places.

In order to analyse the relationship between urban settlements and rivers it is necessary to define these two terms, allowing us to look at their mutual relationship through new and original perspectives. But if river – the second term of the relationship – may be defined with its geographical meaning, the first term is much more complicated to identify.

3.1.1. What could be identified as 'city' in early medieval northern Italy?

At the end of the 1990s, the archaeological and historiographical debate produced a first synthesis highlighting the limits that single disciplines had in studying early medieval town in Europe.[9] Substantially, the previous syntheses, focusing in particular on material aspects, were strongly conditioned by the mutations of the Roman city, with a pessimistic scenario in which the main interest was to understand how much of the ancient cities survived.[10] This perspective changed over the last 30 years, after the growth of urban archaeology, which emphasises more the transitional aspects between the Roman and medieval city. However, the general lack or variability of evidence – especially for the eighth and ninth century in many urban settlements all over Europe – does not allow the formulation of a complete list of those material aspects that characterised an early medieval city.

On the other hand, the written sources – especially the narrative ones – document the perception of the city from the élites' points of view – often seen from a religious perspective – rather than providing information on cities' real form.[11] Saint Ambrose's emphatic expression *semirutarum urbium cadavera*,[12] in describing the state of the cities in Emilia, was firstly a particular aristocratic awareness, following perhaps some literary *topoi*. A similar case is when the city of Pavia (*Ticinum)* was described by Ennodius in the sixth century as *civitatula*, or *oppidum*.[13] In other words, at the beginning of the early middle ages, in the eyes of its

[9] B. Ward-Perkins, 'Continuists, catastrophists and the town of post-roman Northern Italy', *PBSR* 45 (1997): 156–176; G.P. Brogiolo – S. Gelichi, *La città nell'alto medioevo italiano* (Roma-Bari 1998).
[10] E. Dupré Theseider, 'Problemi della città nell'alto medioevo', *Settimane* 6 (1959): 15-46.
[11] S. Gelichi, 'La città in Italia tra VI e VIII secolo: riflessioni dopo un trentennio di dibattito archeologico', in A. García *et al*. (eds.), *Espacios urbanos en el occidente mediterráneo (S. VI-VIII)* (Toledo 2010): 63-64. In general, on these issues see J.K. Hyde, 'Medieval descriptions of cities', *Bulletin of the John Rylands Library* 48/2 (1966): 308-340.
[12] Literally, "semi-destroyed urban ruins", Ambrosius, *Epistolae* 39/3.
[13] Ennodius, *Magni Felicis Ennodi Opera*, SAA 7: 100: «[…] *circa muros Ticinensis civitatulae*». For reconstructions on *Ticinum* and Pavia between the Roman period and the early middle ages see D.A.

contemporaries, Pavia would have been seen as a "small city" near the confluence of the Ticino and the Po rivers. However, even if its size compared to other urban centres in northern Italy like Milan, Ravenna or even Verona was modest, its importance as a military and administrative centre was crucial.[14] Overall, comparison between the archaeological evidence and the written sources on early medieval city does not facilitate a commonly accepted interpretation.

In 1976, Martin Biddle tried to identify a set of criteria that would have allowed early medieval settlements to be recognised as a city.[15] According to Biddle at least four of the following characteristics need to be present at a settlement before it can be identified as a city: presence of defences, a planned street-system, development of markets (stable or annual), right to mint coins, legal autonomy, role as a central place, presence of large and dense population, a diversified economic base, different building materials compared to rural areas, social differentiation, a complex religious organisation, and a juridical centre. However, such a definition cannot be exported and applied to northern Italy, as Chris Wickham has pointed out, stressing the unequal importance of these criteria in different European regions.[16] In fact, the urban scenario of Anglo-Saxon England – Biddle's area of expertise – was characterised by completely different patterns compared to northern Italy. Nevertheless, Biddle's attempt to list cities' main characteristics and the ensuing debate could be a useful starting point in order to discuss characteristic patterns for northern Italian cities, always holding the fundamental concept of variability, which can be considered the very first characteristic of early medieval cities.

Variability can also be useful for a revaluation of previous preconceptions regarding the early medieval city. For example, the binominal association between city and bishop, a feature widely adduced since the last century, is not necessarily shared by all the settlements throughout the entire early medieval period. Contrary to what was imagined in the 1960s and

---

Bullough, 'Urban Change in Early Medieval Italy. The Example of Pavia', *PBSR* 34 (1966): 82-130; P. Tozzi, 'L'impianto urbano di Ticinum romana', in *Storia di Pavia 1. L'età antica* (Pavia 1984): 183-204; P. Hudson, 'Pavia: l'evoluzione urbanistica di una capitale altomedievale', in *Storia di Pavia 2, L'alto medioevo* (Pavia 1987): 237-316, P. Majocchi, *Pavia città regia. Storia e memoria di una capitale medievale* (Rome 2008); Id., 'Sviluppo e affermazione di una capitale altomedievale: Pavia in età gota e longobarda', in *RM* 11/2 (2010): 169-179.

[14] On Milan and Verona descriptions in the eighth century see: *Laudes Mediolanenis Civitatis*, and *Laudes Veronensis Civitatis*, in G.B. Pighi (ed.), *Versum de Verona, Versum de Mediolano Civitate. Studi pubblicati dell'Istituto di Filologia Classica, VII* (Bologna 1960), also in MGH, *Poetae Latine Aevi Carolini I*: 24-26, and 118-122. On the importance of Pavia as administrative centre since the Gothic period see P. Majocchi, 'Sviluppo': 169-179

[15] M. Biddle, 'Towns', in D.M. Wilson (ed.), *The archaeology of Anglo-Saxon England* (Cambridge 1976): 99-150. The set of urban criteria has been initially proposed in the third section of C.M. Heighway (ed.), *The erosion of History. Archaeology and Planning Towns: A study of historic towns affected by modern development in England, Wales and Scotland* (London 1972): 9.

[16] C. Wickham, *Framing the Early Middle Ages: Europe and the Mediterranean, 400–800* (New York 2005): 592.

asserted by Giovanni Tabacco in the following years – especially for the cities of the post-Carolingian period –,[17] the presence of a bishop does not always imply a urban form and role for new early medieval settlements. In this period, bishops had their palaces not necessarily in the main administrative centres of their dioceses, but in nearby smaller and perhaps less dangerous settlements. This is the case – for example – of the bishops of Tongres-Maastricht-Liège, Lambert and Hubert, who established their palace at the beginning of the eighth century in *villa Leodio*, present day Liège.[18] The bishop's presence certainly promoted the growth of Liège, but it is only a century later, under the Carolingians, that the settlement started to acquire economic and administrative importance.[19] In the Po valley, a similar example is early eighth-century Ferrara. As will be explained later, this settlement achieved urban status only at the end of the ninth and more probably during the tenth century, but a bishop has been recorded in this area since the creation of the new episcopal centre at the church of San Giorgio (south-east of present day Ferrara) affiliated with the nearby late antique episcopal see of Voghenza.[20] Therefore, the presence of a bishop cannot be considered necessarily a characteristic of an early medieval city in the Po valley.

Moving on to other features, the investigation of early medieval urban patterns in northern Italy raises four main problems. A first unfortunate issue concerns the greater availability of written sources compared to archaeological excavations, which are mainly limited to specific urban sites, and do not always help in the reconstruction of the urban fabric. If we look at the example of Piacenza, written documentation is the principal source of information, and archaeological evidence is generally lacking for this urban settlement. Although in the countryside around Piacenza archaeological fieldwork has brought to light interesting evidence regarding the Lombard occupation of its territory, no relevant information is available for the development of the urban fabric in the early middle ages, apart from very little evidence mostly from churches and ecclesiastical buildings.[21] It is only possible to reconstruct Piacenza in the first centuries of the middle ages thanks to the substantial amount of written documentation, which is very impressive compared to the other Po valley cities.[22]

---

[17] E. Dupré Theseider, 'Problemi': 35-38. G. Tabacco, 'La città vescovile nell'Alto Medioevo', in P. Rossi (ed.), *Modelli di città. Strutture e funzioni politiche* (Torino 1987): 327-345.

[18] D. Henrard – J.M. Léotard, 'Liège au Haut Moyen Âge: un état de la question', in T. Panhuysen (ed.), *Transformations in North-Western Europe (AD 300-1000)* (Hannover 2011): 47-54.

[19] *Ibid*., 52–54.

[20] See below Chapter 3.1.3.

[21] P. Racine, 'Dalla dominazione longobarda all'anno mille', in *Storia di Piacenza. Dalle origini all'anno mille 1* (Piacenza, 1990), p. 177.

[22] The main way in which Piacenza differs from the other northern Italian cities is the availability of a large number of private charters, see E. Falconi, *Le carte più antiche di S. Antonino di Piacenza (secoli VIII e IX)* (Piacenza 1959). P. Galetti – G. Petracco Sicardi, *Le carte private della cattedrale di Piacenza* (Parma 1978). See also the *ChLat* on Piacenza (8 volumes).

Not only does the prevalence of written documents condition research, but the second obstacle for the analysis of early medieval cities in northern Italy is the terminology used in the documents, which is far from being uniform and clear. In the early middle ages, the classical Latin term of *civitas* lost its Roman meaning which was applied to the *municipia* of the empire. Therefore, not all the settlements called *civitas* in the medieval written sources can be considered to be a city in its Roman conception. For example – as Gelichi pointed out – in the *Historia Veneticorum*, John Deacon calls Cittanova Eraclea, in the Venetian Lagoon, *civitas*. In the same source, Comacchio – mentioned in the previous chapters – is described as *villa*, *castrum* or *insula*.[23] Both settlements had similar lagoon features, with the presence of a bishop and an important role in trade and commerce especially from the sixth century. Looking at the terminological dissimilarity, it is difficult to accept the description of a city based only on written evidence. A similar problem is also when we try to identify a centre as either a *castrum* or a *civitas*, given that these two terms are often used interchangeably when referring to the same site, an issue widely debated in Italian historiography.[24]

In addition, the unclear terminology used to identify cities indirectly leads us to the following issue: the use of specific vocabulary reflecting the author's intention of stressing the role that a settlement had in the narrated events, as in John Deacon's *Historia Veneticorum*. Considering that John Deacon wrote in the 11th century, his perception of these settlements was almost contemporary to the events he describes. The specific use of such a terminology should then highlight the author's viewpoint, a very useful aspect for investigating the political development of the eastern lagoon section of the Po valley. The socio-political context of those years has also to be considered for a better understanding of the author's choice of vocabulary. For example – using the previous example – Cittanova was in the political sphere of influence of Venice while Comacchio, at that time, was considered an economic rival.[25] Thus the identification of Cittanova as a *civitas* and Comacchio as a *villa* or *insula* could be biased by strong political and economic factors.

Nevertheless, it is still possible to find good and valuable information from written evidence for the identification of what could be considered as a city. Looking at early medieval narrative sources, their perspectives on cities and urban settlements reflect contemporary socio-political patterns, an aspect that should also imply a difference between those territories

[23] John Deacon, *Historia Veneticorum*, L.A. Berto (ed.) (Bologna 1999). See also Gelichi, 'La città', p. 65.
[24] On this aspect see G.P. Brogiolo, 'Evoluzione in età longobarda di alcuni castelli dell'Italia settentrionale', in E. Boldrini – R. Francovich (eds.), *Acculturazione e mutamenti. Prospettive nell'Archeologia medievale del Mediterraneo* (Firenze, 1995): 191-200. L. Cracco Ruggini, 'Città tardoantica, città altomedievale: permanze e mutamenti', *Anabases* 12 (2010): 103-118.
[25] S. Gelichi, 'Flourishing places in North-Eastern Italy. Towns and emporia between late antiquity and the Carolingian age', in J. Henninig (ed.), *Post-Roman Towns, Trade and Settlement in Europe and Byzantium: The Heirs of the Roman West* (Berlin 2009): 77-104.

of Lombard or Byzantine traditions. If we look at the situation in Ravenna, for example, it is possible to see a certain continuity with late antiquity in terms of the importance of the city for its territory, a characteristic that also reflects the maintenance of urban structures compared to the majority of other urban centres in northern Italy.[26]

Even if not completely reliable, the use of the narrative sources provides information on specific cities and should always be considered in order to have a clearer picture. Looking at some examples – like Paul the Deacon's *Historia Langobardorum* or Andrew of Bergamo's *Historiola* – few urban characteristics can be identified that belong to the time in which the authors were writing. One of the most significant examples is the presence of city walls: a marked defensive perimeter seems to be, in the narrative sources, a fundamental element for defining a city, not only considering the militarisation of urban centres in this period,[27] but also in a more cultural sense. Walls are seen as boundary between the civic identity and the countryside, marking a clear distinction between what is inside and outside.[28] An interesting example is provided by Jordanes's description of Attila's camp, described as *civitas amplissima* in which the first reported element are its wooden fortifications.[29] Similarly, the destruction of a city was complete when the defensive perimeter was dismantled, annihilating not only the military structures but also the soul of the city. The destruction of Brescello by king Authari in the second half of the sixth century is good example of this.[30] In fact, Paul the Deacon, even if not contemporary to the events, specifies the destruction of the city walls as the final act for the Brescello's identity as a city, stressing its change from *civitas* to *oppidum* in the fourth book of his *Historia*.[31] Nevertheless, this value of the city perimeter in the definition of early medieval city remains a literary *tópos*, considering that, in the diploma issued by Charlemagne in 781 for the bishop Vitalis, preserved as copy in the thirteenth-century *Codex Sicardi*, Comacchio, a settlement without a defensive wall, is named as *civitas*.[32] The idea of the city could be, therefore, described as the sum of different – sometimes contrasting – elements, but with a specific urban identity that separates, more than a wall, what is inside from what is outside, rural

[26] On Ravenna see E. Cirelli, *Ravenna: archeologia di una città* (Florence 2008).
[27] N. Christie, *From Constantine to Charlemagne: An Archaeology of Italy AD 300–800* (Aldershot 2006): 202-6.
[28] For bibliographical references and discussion on this theme see C. La Rocca, 'Trasformazioni della città altomedievale in "Langobardia"', in *Studi Storici* 30/4 (1989): 993-1011.
[29] Jordanes, *Getica*, SAA 5/1, 36: «*Indeque non longe ad vicum, in quo rex Attila morabatur, accessimus: vicum inquam, ad instar civitatis amplissimae; in quo lignea moenia ex tabulis nitentibus fabricata reperimus, quarum compago ita solidum mentiebatur, ut vix ab intento posset iunctura tabularum compre hendi. Videres triclinia ambitu prolixiore distenta, porticusque in omni decore dispositas*».
[30] *HL* 3/18: 124: «*Brixillus capta est, muri quoque eius solum ad usque destructi sunt*».
[31] *HL* 4/28: 157.
[32] *Praeceptum Caroli regis*, in V. Leoni (ed.), *Privilegia episcopii*, CDLM, 1.

and urban, an idea that in the past strongly conditioned the perception of the early medieval city.

The distinction made after the formation of a civic identity, only possible through the analysis of the narrative sources, leads us to the fourth problem regarding the early medieval city in northern Italy: the 'ruralisation' of urban spaces.[33] The few archaeological excavations in urban areas has confirmed over the years a scenario dominated by the progressive extension of green areas, especially after the sixth century.[34] The early medieval city in northern Italy was then characterised by a new urban fabric, in which courtyards, backyards, squares or streets and even houses were rearranged as gardens, orchards or areas for husbandry, redefining urban spaces and losing their Roman connotation as 'city'. Nevertheless, this negative connotation of agricultural urban spaces has been re-evaluated in the last decades, reformulating the incorrect parallelism between ruralisation and fall of the city. The difficulty was to identify other purposes for these spaces, trying to understand the reasons behind the simple presence of agricultural areas in the cities. As Caroline Goodson recently demonstrates in her research on early medieval gardens in Italian cities,[35] urban green areas and their management in élite networks through donations and exchanges of properties seem to indicate strong power connections at an urban level, identifying socio-political and economic strategies among the urban aristocracy. In this sense, the presence of rural areas in urban settlements did not imply automatically the loss of a civic function and identity, but on the contrary their economic value highlights the importance for owners to arrange properties in urban contexts especially for political benefits.[36]

On the other hand, early medieval society seems to maintain a separation between what is inside and outside the city walls. Even if the urban fabric was subject to different uses – with the creation of new spaces and neighbourhoods – and characterised by different materials – in particular wood and *spolia* from Roman buildings –,[37] the preservation of the original centre and its consolidation was a characteristic of many cities like Pavia, Milan, Piacenza, Cremona, Bergamo, Brescia and Ravenna. The shifting of previous urban centres was mainly due to external causes such as destructions (Brescello) or hydrological change, as mentioned above for

[33] The negative concept of *ruralisation* of early medieval Italian cities was initially formulated in G.P. Bognetti, 'L'*exceptor civitatis* e il problema della continuità', *Studi medievali* 7/1 (1966): 1-39.
[34] For a general overview on ruralisation of urban spaces see Gelichi, 'The cities', in C. La Rocca (ed.), *Italy in the early middle ages* (Oxford 2002): 181-82; Christie, *From Constantine*: 183-280.
[35] C. Goodson, *Urban gardening in Early Medieval Italy: cultivating the city* (Cambridge forthcoming), Id., 'Admirable and Delectable Gardens: *Viridaria* in Early Medieval Italy,' EME 27/3 (2019): 416-440, Id., 'Garden Cities in Early Medieval Italy', in R. Balzaretti *et al*. (eds.), *Italy and Early Medieval Europe* (Oxford 2018): 339–355.
[36] *Ibid*.: 354.
[37] For a general overview on the study of building techniques in early medieval Italy see G. Bianchi, 'Modi di costruire, organizzazione del cantiere e politiche edilizie nelle campagne del regno italico tra seconda metà IX e X secolo: continuità o rinnovamento?', in Valenti – Wickham (eds.), *Italy*: 365-395.

Modena. The importance of preserving the city, along with its tradition, identity, and social fabric even with different characteristics, and separating it not only from the countryside but also from other urban centres both in an ideological and perhaps material way – for example in some cases by the actual construction of a defensive perimeter – could be considered the key markers for identifying a city.

Overall, in the early middle ages, the city can be considered as a central place from the political, religious, administrative and socio-economic points of view. But all these characteristics cannot always be identified in the sources, impeding us from having a clear and detailed scheme of the urban structures which were still characterised by local and regional peculiarities. Therefore, it is pointless to struggle in the identification of precise criteria for a city, as variability was the pattern not only of the European early medieval city, but also at a smaller regional scale. The concept of civic identity and socio-cultural preservation that emerges from the sources links together all the attributes of a city. Attributes without which these urban centres lose their function. After all, paraphrasing Fernand Braudel's words, it is not important which specific features are used in its definition because 'a city is a city, whatever it is'.[38]

3.1.2. What is a *river city*?

Having briefly discussed the concept of a city in its general form, I want to focus attention more directly on those urban centres that based their identity and therefore their growth on a strong link with their rivers, at the point that could be identified as *river cities*. In this sense, the concept of river city reflects characteristics of the Po valley amphibious culture as the junction point between river and land itineraries, traditions and socio-economic networks.

Unfortunately, it is not possible to contextualise the concept of river city directly in the Italian historiographical tradition: although many works have been published on topics regarding aspects of early medieval cities – partially discussed above in this chapter –[39] the term 'river city' is not used in early medieval northern Italian studies. In Germany, as well, the study of the city and its relationship with water has been object of several works during the past decades.[40] Nevertheless, even if the use of the term *Flußstadt* is quite common, its definition

[38] The English translation uses the word "town", but in French *ville* can be perfectly translated with city: F. Braudel, 'Pre-modern towns', in P. Clark (ed.), *The Early Modern Town* (New York 1976): 53, and Id., *Civilisation matérielle et capitalisme I* (Paris 1967): 370

[39] Other important works are G.P. Brogiolo – B. Ward-Perkins (eds.), *The Idea and Ideal of the Town between Late Antiquity and the Early Middle Ages* (Leiden 1999); A. Verhulst, *The Rise of Cities in North-West Europe* (Cambridge 1999); G.P. Brogiolo *et al*. (eds.), *Towns and Their Territories Between Late Antiquity and the Early Middles Ages* (Leiden 2000).

[40] In particular E. Maschke – J. Sydow (eds.), *Die Stadt am Fluß* (Sigmaringen 1978).

refers simply to the geographic location of those high medieval cities located next to major watercourses.

Trying to analyse the concept without focusing directly on the medieval period, one of the most illuminating areas in which it is possible to talk about river cities and river towns are the modern era Netherlands. The urbanist Fransje Hooimeijer, in outlining the categories by which the different Dutch water cities should be grouped, suggested a simple definition for a river city, which she defined as those centres – like Maastricht, Nijmegen, Utrecht and Vechten – that based their economy on the river and its trade routes.[41] Considering that, since the end of the middle ages, urbanisation in the Netherlands increased because of the combination of economic opportunity, trade and power, a favourable location on a river, the principal trade route across land, would have brought good economic prospects for such settlements. Therefore, the first characteristic for these centres is the foundation of a market at the node where goods would be traded.[42] In addition, Hooimeijer affirms that dynamics and landscape structures allowed the recognition of two types of river town: those "on the levees" and those "against or on natural high ground".[43]

The latter type of city is settled along the contours of the land, and the urban fabric adapts to the different elevations, with different types of building. Every block is aligned and determined by the way the surrounding territory was previously divided for agricultural activities. In the towns settled on levées, water generally is not within the urban fabric because of the risk of flooding. In addition, connections with the hinterland run parallel to the river along dikes and banks rather than along tributaries.[44] This type of settlement on levees can also be seen in the early medieval Po valley especially in the Emilia plain north of the cities of Reggio and Modena. The main difference, however, is the size of the settlements: in the modern-era Netherlands there are large towns like Zaltbommel, whereas in the Emilian Po valley in the early middle ages the settlements only have a few buildings, for example at sites like San Martino Vecchio, near Guastalla, or Canolo (Correggio).[45]

Cities against or on natural high ground are characterised more by the economic and structural connections that they developed, of course with the river, but also with their hinterlands.[46] This general group brings together the majority of urban settlements in early

[41] F. Hooimeijer – G. Geldof, 'The form and function of water in the city', in F. Hooimeijer – W. van der Toorn Vrijthoff (eds.), *More Urban Water: Design and Management of Dutch Water Cities* (London 2007): 19-58.
[42] *Ibid*.: 22.
[43] *Ibid*.: 22-24.
[44] *Ibid*.: 24.
[45] N. Mancassola, 'Uomini e acque nella pianura reggiana durante il Medioevo (Secoli IX-XIV)', in D. Canzian – R. Simonetti (eds.), *Acque e territorio nel Veneto Medievale* (Rome 2012): 115-132. For further analysis of these small settlements see the next section of the chapter.
[46] F. Hooimeijer – G. Geldof, 'The form': 24.

medieval northern Italy: towns like Treviso, Verona, Cremona, Piacenza and Pavia, situated at a communication node between roads and waterways. Nevertheless, an interesting consideration has been made for those cities 'against natural high ground' that may have some counterparts in the northern Italian case. Even if the term 'against natural high ground' is not very clear in relation to the morphology of the sites, the main characteristics of these urban settlements are: the absence of waterfront structures within or near the urban fabric, relative distance of the town square – the market and place for business – from water, and different urban patterns according to the height of ground level.[47]

Hooimeijer's considerations are based mainly on geographical features, focusing on the location of the settlement in relation with water, and do not consider the social-political and economic dynamics of the modern era in formulating her distinction. Therefore, we could easily apply these filters to northern Italy in the early middle ages with the purpose of identifying contemporary river cities. The very general profile presented by Hooimeijer introduces the topic but a more accurate definition, considering more local patterns, has to be made.

Continuing the analysis, another useful comparison to the early medieval Po valley, could be found in early medieval central France, in the Loire and Rhône valleys, in sites like Tours or Lyon – case studies analysed by Joëlle Burnouf in the volume *Post-Roman Towns, Trade and Settlement in Europe and Byzantium*.[48] Burnouf, distancing herself from the pessimistic view of Henri Pirenne, supports the idea that the long process of urbanisation – which never really stopped after the fall of the Roman Empire – was characterised in early medieval north-western Europe by the formation of new towns, mostly developed on the banks or in the estuaries of the great European rivers. These river cities were then supported by the presence of Scandinavian and Frisian merchants and models of settlements that facilitated connection with trades on waters.[49] Comparing this scenario with northern Italy, it is interesting to note that in the Po valley a wide range of river towns and cities, not only new foundations but also previous Roman and late antique sites, had similar characteristics to those north-western European river settlements, suggesting that this phenomenon was not just circumscribed in a specific area but could also have interesting parallels in other territories.

Burnouf identifies five aspects that characterised these new river towns. The first concerns the surface area occupied by the early medieval settlement, compared with the surface area of the previous and following periods in order to understand its growth as a river centred settlement. The second important element is the presence of dark earth, a common

[47] *Ibid*.: 24-25.
[48] J. Burnouf, 'Towns and rivers, river towns: environmental archaeology and the archaeological evaluation of urban activities and trade', in J. Henning (ed.), *Post-Roman towns, trade and settlement in Europe and Byzantium. The heirs of the Roman west 1* (Berlin 2007): 165-180.
[49] *Ibid*.: 166.

characteristic of all early medieval urban sites.[50] The connections between dwelling spaces and specific groups' activities is the third aspect, while the fourth is the characterisation of the structure and the morphology of the basic unit of spatial organisation like specific plots or buildings. The fifth and last aspect concerns the network of streets in relation to the occupied space. All these criteria need to be interpreted in relationship with the environmental features of the site in order to understand the reasons behind the formation of towns and cities in proximity of watercourses.[51]

This general explanation of the criteria for the recognition of such settlements, however, stresses once again the fact that not all the urban centres that were established near a watercourse can be considered a river city. In early medieval northern Italy, such settlements are difficult to be found on a map for several reasons. The most important is the lack of material evidence that attests a direct link between city activity and water. The only cases that show material evidence of harbour structures allowing us to imagine direct relationship between settlement and water are the new lagoon and delta settlements like Comacchio, the most important early medieval waterfront site in northern Italy (Fig. 5).[52]

Nevertheless, it is difficult to define Comacchio and the other delta and lagoon settlements as a river city. These new early medieval centres developed a strong link with their water and territory but were also characterised by some features that in my view cannot be applied to other Po valley river cities. As highlighted in Chapter 1, the most evident difference is the environment. Even if river environments in this period are still characterised by the presence of small islands, marshes and smaller watercourses that created a quite similar landscape, lagoon and delta areas were also subject to the proximity with the sea. Maritime waters, tides, specific flora and fauna were all elements that the people who lived in these areas had to know and use for their benefit. Looking at the archaeological evidence, this environment did not allow the formation of large centres, especially after the fall of the most important Roman centres, like Altino, Adria and Spina.[53] Building and living in this area implies a good understanding of the attendant risks, leading to the formation of autochthonous communities that adapted to their environment. I doubt, for example, that a citizen from Pavia could have immediately understood the "rules" of the Lagoon, integrating perfectly into these environments. The form itself of the settlements was different. If we compare the reconstruction of the settlement distribution in

[50] See C. Nicosia, *Geoarcheologia delle stratificazioni urbane post-classiche* (Rome 2018): 13-28.
[51] Burnouf, 'Towns and rivers': 167.
[52] For Comacchio see in particular D. Calaon, 'Lo scavo di Villaggio San Francesco 1996 (COM 96). Le strutture portuali di Comacchio?', in Berti *et al*. (eds.), *Genti nel delta*: 505-530.
[53] G. Uggeri, "La Romanizzazione dell'antico delta padano" 40 anni dopo: una revisione', *Atti dell'Accademia delle Scienze di Ferrara* 93 (2015-2016): 79-104. Gelichi, 'Tra Comacchio e Venezia': 365-386.

the territory of Comacchio, Torcello or Venice with centres like nearby Padua or Ravenna, the perception is completely different. It is evident that connections with the surrounding territory, for example, were made with different means of transport and also the role of central place seems, in lagoon areas, to be shared by many settlements in the same area, not identifying precise administrative and power places apart from the ecclesiastical ones.

A second fundamental difference between lagoon settlements and inland river cities was the economy, strongly influenced by the Adriatic Sea. In recent years, archaeological results have emphasised the importance of the site of Comacchio as one of the arrival points of Mediterranean trade, mainly testified by ceramic evidence.[54] Not only as regards trade, but the presence of salty waters allowed different forms of production in these areas. Salt, for example, was one of the most important goods for local and interregional markets, sold in the most important centres of the period like Pavia or Piacenza.[55] On the other hand, inland settlements were more linked to a local production and trade network with strong links to their surrounding territories. As previously mentioned, the presence of urban gardens, *viridaria* and *horti*, in Milan, Pavia, Ferrara and Verona is another difference compared to lagoon and delta settlements.[56] Sites like Comacchio or Torcello probably also had similar production areas in proximity of the settlements themselves, but the fact that we miss their presence in the documents probably could identify the secondary importance compared to the inland cities.

Overall, lagoon and delta settlements and societies contributed to the creation of a different landscape compared to the riverine one. Both types of centre shared some similarities being landscapes equally dominated by water, but they certainly had different needs.[57] Comacchio, Torcello, Cittanova Eraclea and even Venice, in the early middle ages, in different periods, can be described as something between a North sea *emporium* – considering their economic role and survival – and a small town – the bishopric is not to be underestimated, as well as the presence of citizens identified as *milites* in the Capitulary of Liutprand; something not really identifiable at inland Po river cities.

[54] See Chapter 4.1.
[55] On salt trade from Comacchio see L. Bellini, *Le saline dell'antico Delta padano* (Ferrara 1962).
[56] Goodson, 'Garden Cities': 339-355.
[57] On these aspects linked especially on the economic network see Chapter 4.

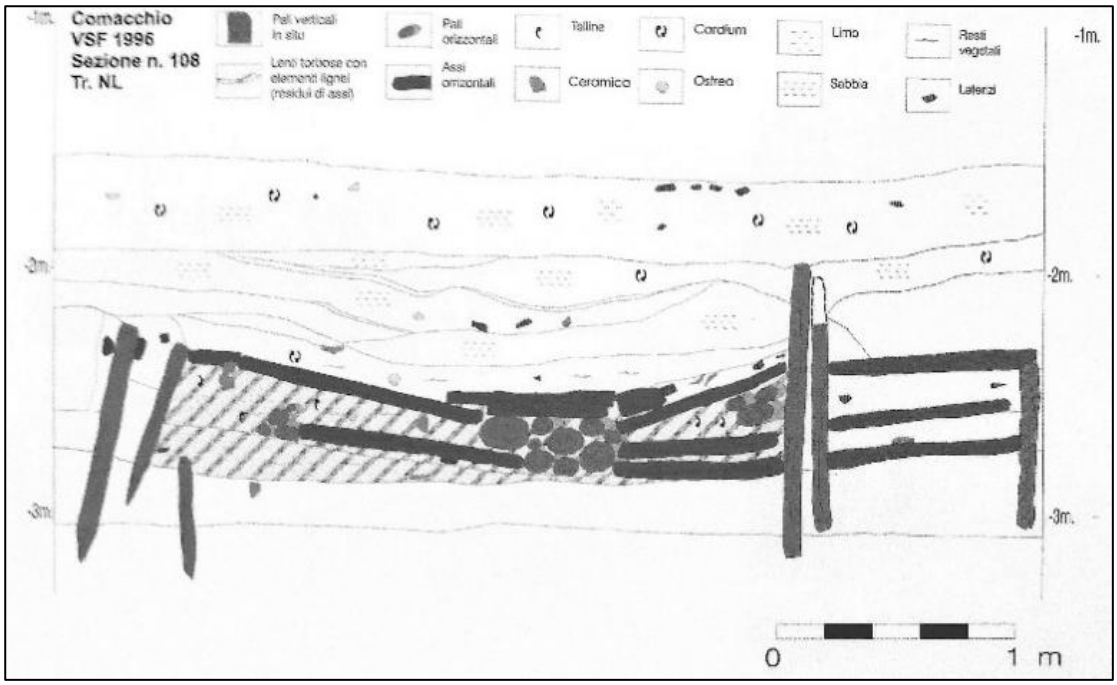


Fig. 5: Comacchio, village of San Francesco waterfront structures, in Berti *et al*. (eds.), *Genti nel delta*: 473.

River cities in the Po valley

Moving our attention to the inland sites, it may be possible to recognise some early medieval cities that survived from Roman times that could satisfy the requirements of a river city, considering their proximity to crucial watercourses, geomorphological features and their economic importance linked to the exploitation of the river and the connections with their territory. Among these centres, for example, Pavia, the capital city of the kingdom, is perhaps one of the most interesting cases. This mention of Pavia is not casual: if one of the most important cities – or the most important one – can be described as river city, this concept itself acquires a stronger significance and confirms the importance of the river system in the kingdom and royal business.

Starting from Hooimeijer's considerations that see the geographical and economic links as the two general patterns of these urban centres, there are six characteristics that identify a river city in the early medieval Po valley, and, despite the limitations of the availability of early medieval sources, it is possible to recognise at five cities as river cities: Ferrara, Cremona and Piacenza on the main course of the Po, Pavia on the Ticino and Verona on the Adige.

The first characteristic is the geomorphological configuration of the settlement. Early medieval river cities were settled in proximity of a fluvial channel, at easier crossing points, on high ground, like fluvial terraces or levées, so as to avoid risk of flooding. If we look at Cremona, Piacenza and Pavia,[58] the principal examples of this settlement in the central section of the Po

[58] P.L. Dall'Aglio *et al*., 'Correlazioni tra geografia fisica e urbanistica antica: il caso della Pianura Padana Centrale', *ASTSN A* 116 (2011): 85-94

valley, they were all settled *ex-novo* during the Roman colonisation of Cisalpine Gaul in the third and second century BC at sites that provided protection from river flooding and gave access through fluvial terrace slopes. Piacenza, for example, was settled on a projection of the Apennine alluvial terrace, overlooking the southern banks of the Po between its two Apennine tributaries Trebbia and Nure. The terrace formed by Apennine detritus has its highest point (60 metres above sea level) in the area close to the medieval cathedral and delimited by via Calzolai and Sopramuro, 10 metres above the Po paleo-channel (see Fig. 6).[59] South of the ancient Roman city, its level drops to around 56 metres above sea level, in correspondence with a Pleistocene Po paleo-channel in the area of the present day Stradone Farnese and the area around San Giovanni in Canale, before rising again in proximity with the late medieval (Farnesiane) city walls and continuing until reaching the Apennines.[60] These morphological features helped the Romans to identify the best spot for Piacenza, considering that here – and also at Cremona – there were easier crossing points between the north and south banks and terraces.[61]

As at Piacenza, at Pavia there is a second crucial characteristic of the geomorphological features of these river cities: the distance of the urban fabric from water. Pavia was settled on the left banks of the river Ticino, on a fluvial terrace bounded by the escarpments of the Ticino and two minor watercourses: the Navigliaccio and Vernavola streams (Fig. 7). These three watercourses delimited a quite extensive naturally defended area. Topographical analysis has identified four separate terraces starting from the fundamental level of the Po plain and including the Ticino's historical flood plain. Between these two, the second and the third terraces are at 66-68 and 76-78 metres above sea level. The large area on which the city was settled was crossed by the slope between the second and third levels on a south-west/north-east axis.[62] At certain points – especially near the Ticino – the difference between third and fourth levels was around 10 metres, theoretically creating a clear geomorphological limit for urban extension, limiting it to a regular area on the second and third terraces. The river water was not allowed to enter within the city perimeter because of the risk of flooding, but the river

[59] *Ibid.*: 88.

[60] *Ibid*.: 88. K. Ferrari *et al*., 'Geomorfologia e città di fondazione in pianura padana: il caso di *Placentia*', in L. Brecciaroli Taborelli (ed.), *Forme e tempi dell'urbanizzazione nella Cisalpina (II secolo a.C.- I secolo d.C.)* (Florence 2007): 85-89. G. Marchetti – P.L. Dall'Aglio, 'Geomorfologia e popolamento antico nel territorio piacentino', in *Storia di Piacenza 2* (Piacenza 1990): 605-653.

[61] P. Tozzi, 'Gli antichi caratteri topografici di Placentia', in *Storia di Piacenza 1*: 325-329. Between the confluence of the Trebbia and the site of Cremona, there are five locations where the river allows easier crossing points between the north and south banks and terraces: starting from west, Castel San Giovanni and Pieve Porto Morone, followed by Boscone Cusani and Corte Sant'Andrea, Piacenza and San Rocco al Porto, San Nazzaro and Castelnuovo Bocca d'Adda, and finally Castelvetro Piacentino and Cremona. See Marchetti – Dall'Aglio, 'Geomorfologia': 655.

[62] P.L. Dall'Aglio *et al*., 'Correlazioni': 85-94.

cities developed in order to be as close as possible to the river, favouring a more direct link to and control of the riverbanks, and maintaining control over the area more exposed to flooding risk.[63]

At Pavia, we also see a third element that characterises river cities in the Po valley: the adaptation of the form of the urban fabric to the nearby water. In fact, the edge of the city in the early middle ages was between the third terrace and the flood plain of the Ticino, and it was delimited on its north-western and south-eastern sides by the ancient Roman canal called the Carona, which flowed parallel to the city walls and was still mentioned in the medieval documents.[64] Other adaptions to water courses are evident also at Cremona – where the Cremonella stream delimited the city on its northern side – and Piacenza – where the already-mentioned Po paleo-channel, underlying the present day Stradone Farnese, was probably converted to a canal, at least in the Roman period, which also improved the defensibility of the site –.[65]

A fourth characteristic of an early medieval river city in the Po valley is the connection between the river and the city's central marketplace. Part of the movements on rivers were for the supply of the river city markets which became one of the junction points between the water and land economy. However, the markets mentioned in the written documentation seem to be located far from the water and the riverbanks. If we look, for example, at Piacenza in the second half of the ninth century, new markets were formed after the donation of Louis II to the bishop of Piacenza in the southern area of the city,[66] in particular near the churches of Sant'Antonino, San Siro and San Lorenzo. These markets seem also to be one of the reasons for the formation of new suburban areas near the south-western gates, which were centres for a number of artisans who, according to the rich documentation of the archives of the Cathedral and the church of Sant'Antonino,[67] seem to hold properties especially near the city gates (*portae*) of Sant'Antonino and near the church of Santa Brigida. Looking at the map (Fig. 6), we notice that these areas were quite distant from the river and were concentrated in the most stable area of the fluvial terrace, not far from the cathedral. This would allow a more direct connection with

[63] P. Tozzi, *Saggi di topografia storica* (Florence 1974): 18-19.
[64] Mills on the Carona banks are mentioned for the 10th and 11th century, see Hudson, 'Pavia': 275, see the document in CDL III/1, 11: «*molendina, que in Caterona seu in aliquibus fluminibus predicta ecclesia possidet*».
[65] L. Passi Pitcher, 'Archeologia della colonia di Cremona: la città e il territorio', in P. Tozzi (ed.), *Storia di Cremona: l'Età Antica* (Azzano S. Paolo 2003): 130-229. The presence of 'public' watercourses surrounding the city of Piacenza is evident in the charters, such as *ChLat Parma 2*, 34 where a mill is mentioned along one of them: «*molino uno iuris ipsius ecclesie Sancti Savini, qui est posito foris muro civitatis Placencia in rio publico*».
[66] DD L II, 56 (872).
[67] For example, the goldsmith Adalbert is mentioned in three charts: Falconi, *Le carte più antiche*, 38, 41, 78.

the hinterland of Piacenza, considering the presence of the important Roman *viae Aemilia* and *Postumia* that were close to this area of the city. In this scenario, the river was quite far from the marketplace, especially in the early middle ages. In the Roman period the situation was slightly different: the north/eastern section of the city, that closest to the river, was crossed by the *fossa Augusta*, the principal Roman canal/harbour structures that directly linked the city to the Po main course and vice versa. The *fossa* seems to be inactive after the fourth century, as indicated by nearby abandonments of previously inhabited areas in present-day via Genocchi.[68] There is no proof that this canal or other canals were in function in the early middle ages, but it is possible that these features had for other functions like irrigation, defence or the transport of smaller containers and goods from the river to the new markets in the south of the city.

The port or other harbour structures, which help to identify a river city, are a crucial element in this link between the river and the river city markets. Like markets, after the mid-ninth century ports became important juridical objects for the élites who wanted to preserve their control over the movements of people and goods on water. Even if written documents report the presence of *porti* and *portora*, it is interesting to note that no archaeological evidence of harbour or waterfront structures have been found at any inland river cities. Apart from the lack of material evidence, another characteristic of these ports was their location, which seems to be situated outside the city perimeter, as a result of the adaptations of the urban fabric to the flood risk. The most interesting examples are at Pavia and especially at Piacenza.

The written sources of the ninth and tenth centuries attest the presence of a *portus Ticinensis* along with at least three other distinct ports linked to the city of Pavia: one near the *torre Bianca*, which should be located not far from the south-west section of the city walls, upstream of the ancient Roman bridge and in possession of the nuns of Sant'Agata; the *portus cavallaricius*; and the port of *Sclavaria*.[69] Considering the geomorphological features of Pavia, most mooring areas should have been located south-east of the city perimeter including the port called *Sclavaria*, mentioned in a diploma dated in May 916 of the monastery of Santa Giulia of Brescia.[70] In this diploma Berengar I, emperor and king of Italy, allowed the monastery to fortify the port *quod dicitur Sclavaria*, which had been property of the abbess since the late-ninth century.[71] The precise location of this port was studied by Fabio Romanoni, who, on the basis of toponymical similarity, identified the area south-east of the church of San Lazzaro, near the lost church of Santa Croce – destroyed by flooding in the eighteenth century and close to

[68] The *fossa Augusta*, later known as Fodesta, seems to be again active from the eleventh century, M.L. Pagliani, *Piacenza. Forma e urbanistica* (Rome 1991): 74. C. Bradbee, 'Imprints: the history of water management and canals in Piacenza, Italy', *Urban History* 44/2 (2017): 188-207.
[69] A.A. Settia, 'Pavia carolingia e post-carolingia', in *Storia di Pavia 2*: 119-23.
[70] DD Ber I, 110.
[71] Santa Giulia, *Inventarii*, 92.

one of the paleochannels of the Ticino – as the most likely spot for *Sclavaria*.[72] The port was not too far from the city centre and along the important communication route that linked Pavia with Cremona, an area with many fiscal properties,[73] a possible indicator of the socio-economic importance of the area in which the harbour structures could have been located. Geomorphological patterns partially confirm Romanoni's hypothesis, as the river meandered towards north at the site,[74] facilitating the formation of mooring points. Therefore, this location near the earlier riverbank in proximity of the contemporary Vernavola stream could be a good site for new archaeological investigations looking for Roman and medieval waterfront structures near the Ticino. Here, the river route and the terrestrial road are quite close to each other, allowing different accesses to the area, and the small natural mound – located between the Vernavola and the Ticino actual course – could also have been used as the location for the fortification mentioned in the diploma and allowed to the monastery of Santa Giulia of Brescia by Berengar.

In the case of Piacenza, the impressive amount of written evidence allows us to identify four possible harbours linked to the city.[75] The first mention of a port at Piacenza is in the already mentioned Capitulary of Liutprand. Among the other important ports and toll stations that the merchants from the delta settlement had to pass through in order to pursue their salt trade along the Po, the document mentions *Placentia*.[76] In the following century three other ports are named along the main course of the Po: the *portus placentino*, the port of *Codaleto* and possible harbour structures in *Caput Trebie*.

The *portus placentino* was donated by the Lombard king Desiderius to the monastery of San Salvatore of Brescia and this was confirmed again in 851 by Lothar and Louis II.[77] The

[72] F. Romanoni, 'Note sul porto di Sclavaria di Pavia', in *Bollettino della Società Pavese di Storia Patria* 104 (2004): 247-264.
[73] Hudson, 'Pavia': 271.
[74] Burnouf, 'Towns and rivers': 173.
[75] The ports of Piacenza have been the topic of several studies since the nineteenth century: B. Pallastrelli, 'Il Porto e il Ponte del Po presso Piacenza', *Archivio Storico Lombardo* 4/1 (1877): 9-38. A. Solmi, 'Le diete imperiali di Roncaglia e la navigazione del Po presso Piacenza', *Archivio Storico delle Province Parmensi n.s.* 10 (1910): 18-45. G.C. Zimolo, 'Piacenza nella storia della navigazione interna', *Atti Congresso Storico Lombardo* 3 (1938), 168-195. P. Racine, 'Il Po e Piacenza nel Medio Evo. Per una storia economica e sociale della navigazione padana', *Bollettino Storico Piacentino* 63 (1968): 26-37.
[76] *Constitutio Liuthprandi regis*. The document reports a *porto qui dicitur Lambro et Placentia*. Many authors in the past interpreted this as referring to a single port between the river Lambro and Piacenza. However, considering the importance that the Lambro had for connections between the Po and Milan – as explained in R. Balzaretti, *The Land of Saint Ambrose: Monks and Society in Early Medieval Milan* (Turnhout 2019) – and the presence since the Roman period of an active harbour at Piacenza, it is more likely that the description in the capitulary referred to a port on the Lambro, in proximity of its confluence with the Po, probably close to the point where the Roman road between Cremona and Pavia crossed the river. Therefore the mention *et Placentia* should refer to the main city port, that was given to the episcopal church since the Lombard kings and confirmed in later diplomas by Charlemagne, Louis the Pious and Louis II, see Falconi, *Le carte più antiche*, 5: 7.
[77] CDL, 73: 294.

concession of Desiderius is particularly interesting because it specifies the rights of *transitum* of the Po near Piacenza through the port for the monks and the agents of the monastery.

Arrigo Solmi – on the basis of Hildeprand's diploma of 744 – proposed that Codaleto was not far from Sparavera,[78] a location east of Piacenza that at the time was close to the so-called *rivo Frigido*, a watercourse which not clearly recognisable in the geomorphological map. The most probable explanation is that the *rivo Frigido* was a branch of the Po that diverted slightly south-east from the main course and after the hydrological mutations recorded in the same 744 diplomas, disappeared in the following centuries.

The final mention of possible waterfront structures linked to the control of the river navigation in the tract between the Trebbia confluence and Piacenza is the *cellula* in *Caput Trebie* (Cotrebbia) mentioned in the testament of Angelberga of 872 for the new-born monastery of San Sisto.[79] The property was then confirmed by Carloman of Bavaria and later by Charles the Fat in 882.[80] The specific function of controlling the river at this point should also imply the presence of some kind of harbour structures, moorings or docks for facilitating the control of the vessels that were navigating the Po and those crossing the Trebbia.

All the above-mentioned ports, even if outside the urban fabric, were linked to the city which represented the principal market and obligatory passage for people and goods both on water and road. Pavia and Piacenza through their ports were exploiting their central function of river city in both an economic and political perspective. The ports, located in areas that facilitated a more direct connection with the river (far from the terrace), became quickly juridical objects for old and new powers – like the new monasteries of San Sisto in Piacenza or San Salvatore/Santa Giulia of Brescia – that were competing for the control of waters and their profits in this crucial section of the Po valley, promoting the growth of the settlements.[81]

A last element to be considered in the definition of river city in the early medieval Po valley, is inevitably the connection of these settlements with their hinterland. Piacenza – again – is the best documented, although Verona is similar in terms of availability of documents and traceable networks.[82] These cities in the early middle ages were the centres of the administrative

[78] Solmi, 'Le diete': 20-22. CDL III/1, 18: «*Verum quia et suggessisti nob(is), q(uo)d a bone recordationis domno n(ost)ro concessa fuisse ex portu quae dicitur Codaleto* [...]. *Super haec aute(m) cedimus atq(ue) donamus ex n(ost)ra largitate iamdictç eccl(esi)e v(est)re vel vobis lectu(m) Padi, unde ante hos dies cucurrit et nunc reliquid prope civitate Placentine, idest fine caput de rivo, qui dicitur Frigido, usq(ue) in fine de Sparoaria, qu(em) vob(is) et propriis nostris tradidimus manibus*.»

[79] E. Falconi, *Le carte cremonesi dei secoli VIII-XII, I* (Cremona, 1979), 20: 49-58. On the policy of Angelberga for San Sisto see R. Cimino, 'Angelberga: il monastero di San Sisto di Piacenza e il corso del fiume Po', in T. Lazzari (ed.), *Il patrimonio delle regine: beni del fisco e politica regia fra IX e X secolo*, *RM* 13/2 (2012): 141-162.

[80] DD Kn, 5: 291, and DD Kar III, 56: 96.

[81] On these aspects concerning the control of the river network see next chapter.

[82] On Piacenza see G. Musina, 'Caratteri identitari dei villaggi altomedievali del Piacentino', in P. Galetti (ed.), *Paesaggi, comunità, villaggi medievali* (Spoleto 2012): 681-692; Id., *Le campagne di Piacenza tra VII*

activity, of the economic network on both water and land especially after the arrival of the Carolingians. As will be better explained in the next chapter, the arrival of the Frankish rulers imposed new agents that operated in the river cities network.

Overall, even if they differ slightly from those models identified by Burnouf's criteria, Pavia and Piacenza can be considered the best examples of river city in the early medieval Po valley on the basis of their abundant written sources and scanty archaeological evidence. In fact, these case studies show continuity of settlement occupation and a more limited presence of dark earth, in contrast to the northern European cases. However, the division of the urban fabric according to different human activities, like the creation of new neighbourhoods, and artisans' suburbs reflect similar patterns to those highlighted by Burnouf, as well as the buildings based on wood and *spolia*. Looking at Po valley examples, it is undeniable that river cities were a phenomenon that was not just limited to northern Europe and river delta areas, but interesting examples, with a more ancient origin, can also be found in more inland territories, far from the coast.

In conclusion, after this brief account of early medieval river cities in the Po valley, I would like to stress the most significant features that characterised these settlements compared to other areas of Frankish Europe.

Firstly, it is possible to note a significant growth in importance of river cities in the written documentation and urban fabric expansion starting in the eighth century but more strongly after the second half of the ninth century. This was in part caused by the new Carolingian rulers who allowed a tighter control on movements and economic flows in the Po valley, promoting river cities like Cremona, Piacenza and Pavia as compulsory passages for people and goods. After spring 773, the Franks occupied northern Italy, placing groups of warriors at strategic points in order to control the movement of people and goods. In this scenario the occupation of river cities like Pavia and Piacenza was a crucial episode in the Carolingian conquest of northern Italy. The Carolingians directly or indirectly allowed the enlargement of the urban fabric, imposing new authorities like bishops and counts,[83] who started to accumulate properties and lands donated by kings, becoming the most important figure in the economic life of the river settlement, holding market and harbour rights.[84] Parallel to the increase of new powers in the city and of the power of the bishop, the growth of the river cities was favoured by new ecclesiastical foundations that led to the creation of new

e IX secolo: insediamenti e comunità, PhD Thesis, University of Bologna (2012). On Verona, A. Castagnetti, *Il Veneto nell'alto medioevo* (Verona 1990): 170-179.

[83] For example, in Piacenza, a new count, Arvin, after 791, as head of the city substituting the Lombard duke and *gastaldus*, see E. Hlawitschka, *Franken, Alemannen, Bayern und Burgunder in Oberitalien (775-962): Zum Verständnis der Fränkischen Königsherrschaft in Italien* (Freiburg 1960): 27.

[84] See Chapter 4 introduction.

neighbourhoods and suburban areas. For example, at Piacenza, the Frankish presence and support for the bishop Seufrid II favoured the construction in 855 of a new cathedral closer to the ancient Roman city centre.[85] A similar trend is also observed in Pavia, and between 850 and 950 it is possible to observe an intensification of building activity within the city walls with other new church foundations – in line with the north Italian trend,[86] but reaching the highest peaks in the river cities indicating an even more dynamic picture.[87] These new ecclesiastical foundations had a great impact on the urban fabric that led in some cases, like Piacenza, to an extension or modification of the city walls.[88] Last but not least, apart from the role played by the new authorities, a crucial part in the development and growth of these cities should have been played by the social fabric itself. Although there is very limited historical and archaeological evidence on their activity, these cities became those junction points between land and river through the work of their citizens that based their business on the opportunity provided by the river and its waters. As will be better explained in Chapter 4, the socio-economic networks were a motor for these settlements and their inhabitants, but the contribution made by urban markets, artisans and corporations is not to be underestimated.

A second remark on river cities regards the lack of archaeological evidence for harbours and waterfront structures, making it difficult to identify with precision the links between river navigation and urban centres. However, the lack of large urban harbours directly connected with the urban fabric and its principal market does not change our understanding of Pavia, Piacenza, Cremona, Verona and Ferrara as river cities. In fact, written sources confirm the presence of suburban harbour structures outside the perimeter of the city walls. The importance of these ports is clear from the written sources and impedes us from looking at these cities without mentioning their rivers. For Pavia for example, the large number of *cellae* of different ecclesiastical institutions placed within the city centre, mentioned in the documents,[89] used both as stores or accommodation by bishops, abbesses or simple workers, testifies the significant role of the city as a central place for the economy and the administration, and the importance of Pavia's harbour(s) as a key exchange point for people and goods travelling on the Po and its tributaries and on the land itineraries. The most likely reason behind the lack of

[85] Racine, 'Dalla dominazione': 229-230.
[86] Cirelli, 'Le città': 155-157. Scholars refer to the period between 850 and 950 as 'the golden age of early medieval Pavia', see Hudson, 'Pavia': 261-67.
[87] Cirelli, 'Le città': 230.
[88] According to the document of 872 published by the sixteenth-century antiquarian Pietro Maria Campi, as a result of these new foundations it was necessary to extend the area enclosed by the city walls trying to include the new buildings that evidently were still without protection (DD L II, 56). P. Racine, 'Dalla dominazione': 230. See also Louis II's permission to Angelberga to build a new tract of the city walls specifically in order to include the new monastery of San Sisto, in Galetti – Petracco Sicardi, *Le carte*, 3: 65.
[89] For the *cellae* bibliography and list of documents see Settia, 'Pavia': 297-306.

evidence for waterfronts or harbours at the river cities of the Po valley was that there was simply no need for such structures near the river. The natural shape of the river banks allowed the formation of natural mooring points for boats navigating on the Po and its tributaries, and port structures, likely of wood – already seen in other European contexts –[90] were probably placed in these areas, but because wood is perishable and of shifts in river meanders, they are now archaeologically invisible.

Finally, it is interesting to note that there almost no examples of entirely new urban settlements that developed as river cities in the early middle ages. Most river cities in the Po valley obtained this status since the Roman or late antique periods like Piacenza. Considering that – as explained above – the delta and lagoon settlements cannot be described as river cities, the only early medieval city that could be considered in this category is perhaps Ferrara, which only became a city at the end of the ninth century. Ferrara was the actual gateway that separated the delta and Po's inland course and navigation system. For these reasons, Ferrara is possibly the best example to understand the dynamics that led to the development of river cities in the Po valley.

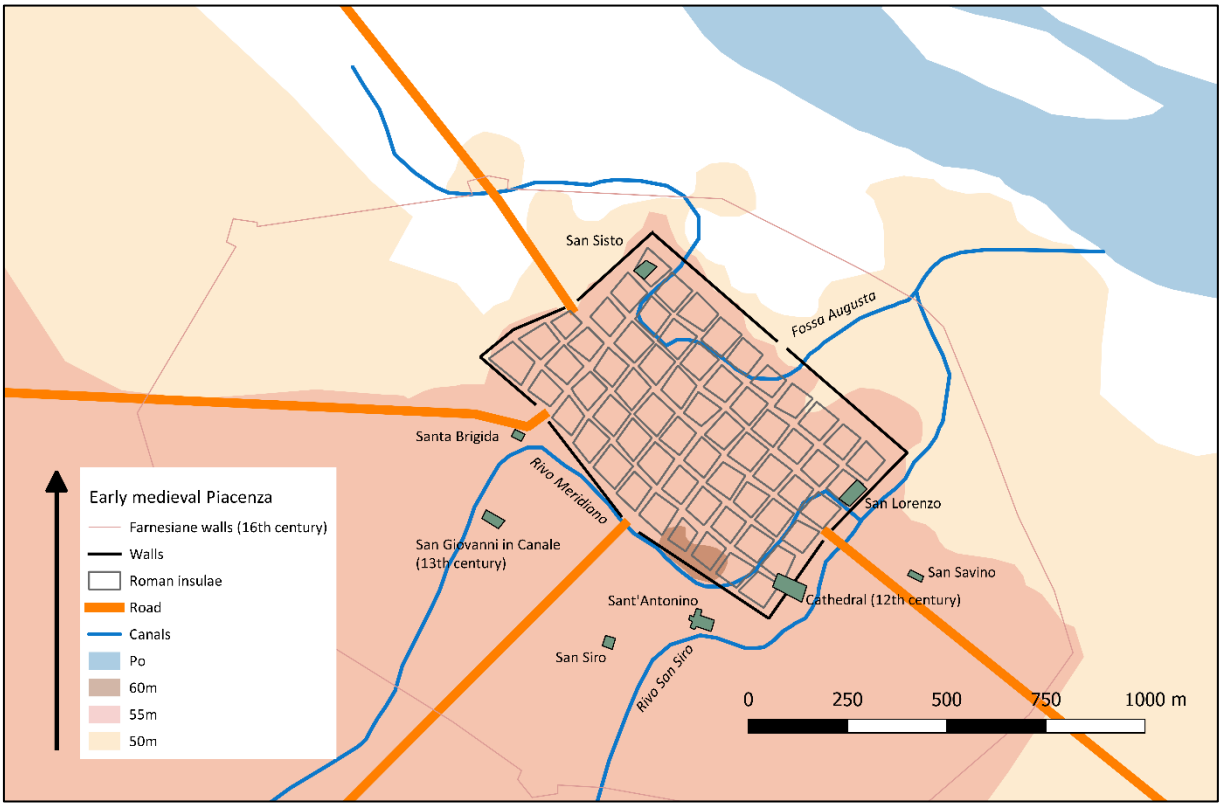


Fig. 6, Early medieval Piacenza, after Dall'Aglio *et al.*, 'Correlazioni': 85:94, Ferrari et al., 'Geomorfologia': 85-89, Bradbee, ' Imprints': 195.

[90] For an overview on this archaeological invisibility for harbours in Germany see L. Kröger – L. Werther, 'Vom Rhein zur Donau - Überlegungen zur Binnenschifffahrt zwischen Römischer Kaiserzeit und Hochmittelalter', in R. Atzbach *et al.* (eds.), *Archäologie, Mittelalter, Neuzeit, Zukunft: Festschrift für Ingolf Ericsson* (Bonn 2017): 249-282.

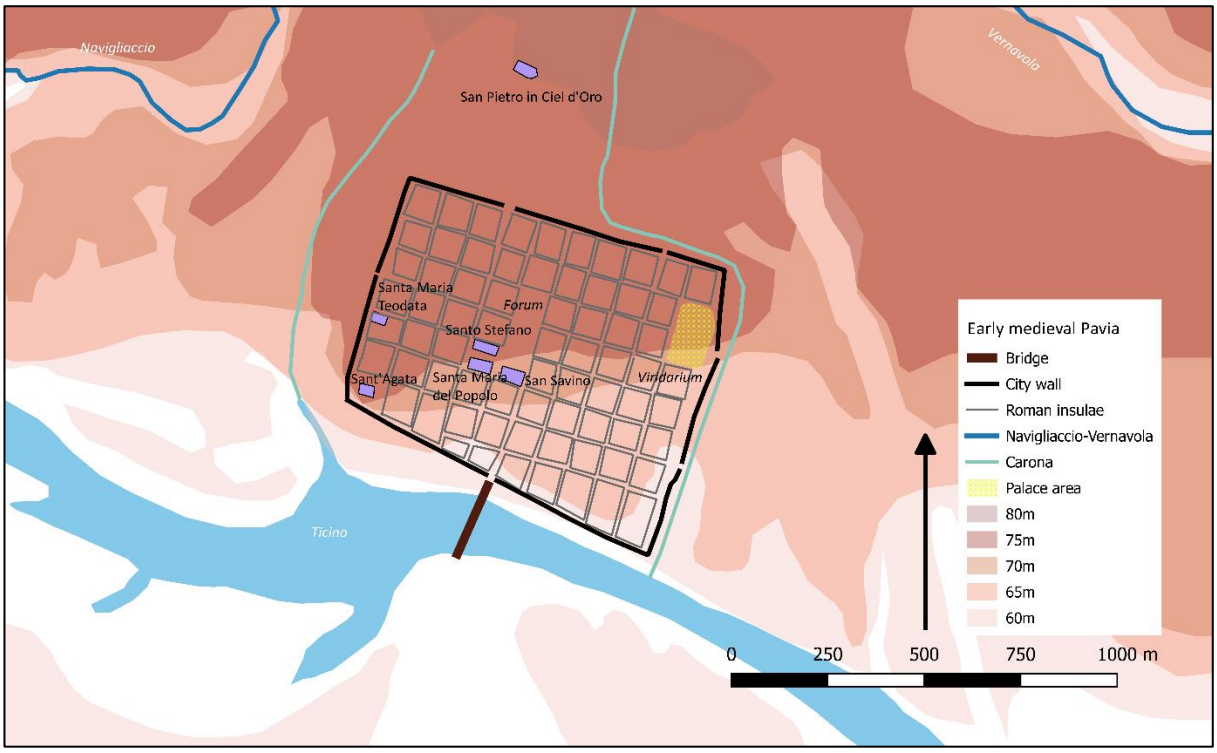


Fig. 7, Early medieval Pavia, after Dall'Aglio *et al*., 'Correlazioni': 85-94, Hudson, 'Pavia': 308-311.

3.1.3. Ferrara: an early medieval river city.

In contrast to Cremona, Piacenza, Pavia and the other major urban centres in the Po valley, the city of Ferrara in the modern region of Emilia-Romagna did not originate as a Roman *municipium*. The reconstruction of Ferrara's origins is at the centre of a historical and archaeological debate that started in the 1970s – with publications by Francesca Bocchi and Stella Patitucci-Uggeri – and developed over the following years, with important contributions from archaeology.[91] All scholars since then agree on the close connection that the Po had with

[91] F. Bocchi, *Note di storia urbanistica ferrarese nell'alto medioevo* (Ferrara 1974); Id., 'Ferrara, una città fra due vocazioni: urbanistica e storia da piazzaforte militare a centro commerciale', in *Insediamenti nel Ferrarese. Dall'età romana alla fondazione della Cattedrale* (Florence 1976): 125-52. S. Patitucci-Uggeri, 'Un'evidenza archeologica per il medievale *castrum Ferrariae*', *Bollettino Annuale dei Musei Ferraresi* 3 (1973): 85-92; Id., 'Scavi nella Ferrara medioevale. Il *castrum* e la seconda cerchia', *Archeologia Medievale* 1 (1974): 111-47; Id., 'Il castrum Ferrariae', in *Insediamenti nel Ferrarese*: 153-8. For more recent views see A. Castagnetti, *Società e politica a Ferrara dall'età postcarolingia alla signoria estense (secoli X-XIII)* (Bologna 1985); D. Gadd – B. Ward Perkins, 'The development of urban domestic housing in north Italy. The evidence of the excavations on the San Romano Site, Ferrara (1981-4)', in *The Journal of the Accordia Research Centre* 2 (1991): 105-27. S. Gelichi, 'Il Castello estense e l'archeologia urbana a Ferrara: riflessioni dopo un decennio di ricerche', in Id. (ed.), *Ferrara prima e dopo il castello. Testimonianze archeologiche per la storia della città* (Ferrara 1992): 15-21. C. Guarnieri – M. Librenti, 'Ferrara, sequenza insediativa pluristratificata via Vaspergolo Corso Porta Reno (1993-94). 1. Lo scavo', in *Archeologia Medievale* 23 (1996): 275-307. S. Patitucci-Uggeri, *Carta archeologica medievale del territorio ferrarese I, Forma Italiae Medii Aevi* (Ferrara 2002); M. Librenti – C. Negrelli, 'Le indagini archeologiche 1990-1991 a Ferrara. Dati per la topografia tardomedievale dell'area urbana', in R. Francovich – M. Valenti (eds.), *IV Congresso Nazionale di Archeologia Medievale* (Florence 2006): 109-13. S. Gelichi, 'Hodierni vero vocant Ferrariam.

the birth of Ferrara on its banks and its growth starting from the high middle ages. For this reason, Ferrara could be considered as an excellent case study in order to investigate the concept of river town from an exclusive early medieval perspective, since it is free from the heavy Roman legacy that conditioned the study of early medieval town and cities of northern Italy and the Po valley.

Ferrara's mythical origins

Even if much of our understanding of late antique and early medieval Ferrara comes from archaeology, there are three different mythological traditions concerning Ferrara's origins. The first is based on a spurious document called the *Theodosian Bull*, dated 9 May 423 but forged in Bologna in 1225.[92] In this bull the inhabitants of Ferrariola are obliged to abandon the previous settlement on the south banks of the Po and move to the north side, settling at a new centre, Ferrara, no later than 425. According to the document, an original settlement already existed at the beginning of the fifth century but with its primary centre around the church of San Giorgio, on the south banks of the Po. This tradition was followed by Riccobaldo at the beginning of the fourteenth century in his *Chronica parva Ferrariensis*, the first document that can be called exclusively *ferrarese*. Nevertheless the validity of the Theodosian bull can be questioned on three grounds from three different disciplines: 1) no archaeological evidence has been discovered for settlements near San Giorgio, 2) the first mention of the church is in 936, and 3) the strategic importance of the site at which Ferrara is settled, due to the development of the new branch of the Primaro Po, was not that evident before the seventh and eighth centuries.[93]

The second tradition is based on Giovanni Boccaccio in the fourteenth century according to whom Ferrara developed from the Roman settlement of *Forum Alieni*, mentioned by Tacitus in his account of the military manoeuvres of the first century in the southern Veneto. The location of *Forum Alieni* has also been linked to another site, possibly in an area east of Ostiglia.[94]

A third and final version of the myth was developed by Flavio Biondo in the mid-fifteenth century in his work *Italia Illustrata*. Biondo's version of the origin of Ferrara is probably the most popular and shared both by historians and archaeologists like Francesca Bocchi and Stella Patitucci-Uggeri.[95] According to this tradition and considering the historical context at the very beginning of the seventh century and the scarce archaeological finds, the two centres of Ferrara

Il mito delle origini antiche di una città e l'archeologia', *Annali Online di Ferrara – Lettere* 1 (2012): 3-21. Finally the volume *Anno 413. Nascita di Ferrara? Astrologia e Storia alle Origini della Città, Supp. Atti dell'Accademia delle Scienze di Ferrara* 91 (2013-2014).

[92] G. Fasoli – G.B. Pighi, 'Il privilegio Teodosiano: La composizione del falso diploma teodosiano', in *Studi e memorie dell'Università di Bologna, n.s.* 2 (1961): 58-75, 77-94.

[93] S. Patitucci Uggeri, 'Il *castrum* bizantino di Ferrara', in *Anno 413*: 8-9.

[94] Bocchi, 'Ferrara': 129. Gelichi, 'Hodierni': 6.

[95] Patitucci-Uggeri, 'Il *castrum'*: 7-24. Bocchi, 'Ferrara': 125-52.

and Argenta were founded as Byzantine *castra* as part of a precise defensive strategy by Smaragdus, exarch of Ravenna.[96]

Even if the creation of the *castrum* in 604 by order of Smaragdus seems plausible and coherent with the political background of the period, it is, however, fundamental to verify what the sources of the period tell us about late antique and early medieval Ferrara. The aim is to analyse the birth of Ferrara in the light of geomorphology, archaeology and texts in order to see how the connection with the Po determined the early life and later developments of this river settlement in the eighth, ninth and stretching into the tenth century.

Geomorphological perspective

The first geomorphological analyses of the territory of Ferrara were at the beginning of the 1970s – especially – in works by Marco Bondesan on the entire eastern part of the Po valley.[97] The geomorphological importance of the site has been reprised and highlighted also in a recent study by Marco Stefani and Marco Zuppiroli, in which the link between urban morphology, geology and hydrology is analysed in depth, evidencing Ferrara's location as the most important resource for the city's growth in the middle ages.[98]

In the last decade fieldwork has been conducted in the historical city centre of Ferrara especially in yards and parks, but in the outlying areas there is more difficulty due to large-scale construction during the last century.[99] Nevertheless for the early period of Ferrara's history these problems do not represent a serious limit to research, given that the early spread of the city was quite limited to the area near the river.

The early medieval site of Ferrara was settled near the triple junction between the Po alluvial plain, the Po delta area and the Reno alluvial plain, as shown in figure 8. Nevertheless – as highlighted by Stefani and Zuppiroli – the geomorphological features of the urban area of Ferrara share more characteristics with river low plain environments than with delta patterns, which are closer to marshes and maritime features. Therefore, when talking about early medieval Ferrara we are referring to a river environment and settlement, with different roles and features compared to the delta settlements.

Ferrara's territory is characterised by the presence of different depositional units and subsidence rates mainly due to the tectonic deformation of the Apennine foreland-basin.[100] The

[96] F. Biondo, *Italy Illuminated, I*, J.A. White (ed.) (Cambridge 2005): 346.
[97] Bondesan, 'Origine': 17-39; Id., 'L'evoluzione': 227-263. See also G. Bartolomei *et al*. 'Studio geologico coordinato per la pianificazione territoriale del Comune di Ferrara', *Memorie Società Geologica Italiana* 14 (1975): 165-205.
[98] M. Stefani – M. Zuppiroli, 'The interaction of geological and Anthropic processes shaping the urban growth of Ferrara and the evolution of the surrounding plain', *Il Quaternario* 23/2Bis (2010): 355-72.
[99] *Ibid*.: 357.
[100] *Ibid*.: 356.

natural meandering of the watercourses, especially in the northern low plain was induced not only by natural aggradation of watercourses, but also by the lateral gradient of subsidence and climate changes. These paleo-environmental changes led to a redefinition of hydrology and river system between Roman and early medieval times in the area, modifications that were not only due to natural factors. In fact, anthropogenic aspects also severely conditioned watercourse changes in this area. Leaving aside climate variations and other natural aspects, the abandonment of the extensive hydraulic works carried out during the Roman period – especially in the area south of Ferrara – caused unstable environmental situations dominated by a new river framework.[101] The river avulsion generated a new more western channel of the Reno compared to the previous Roman course, so that there was the formation of large marshes in the area of the previous course of the Reno. East of Ferrara, the Po of Volano became much more important becoming the principal branch of the Po in the delta.[102]

Starting from the seventh century, the predominance of the Po di Volano is also evident from the new actors that were established close to its course. For example, the Abbey of Santa Maria of Pomposa seems to be founded more or less in this period near to the mouth of the Po of Volano.[103] Comacchio also became an important economic centre both for production and trade during the seventh century, and its economic network, based also on inland watercourses, will have passed along the Volano and the southern branches of the Primaro and Padovetere,[104] necessarily passing through the site at which Ferrara was first settled, following the inland navigation route.

The settlement of Ferrara developed on a sandy crevasse splay structure elevated on the northern levée of the Po of Volano reaching a peak height of around 12 metres above sea level.[105] The site was characterised by drier and firmer ground compared to the surrounding argillaceous inter-fluvial depressions. Not far from the original centre on the levée, evidence of anthropogenic structures have been recently discovered, especially the construction of a canal that probably delimited the first settlement area, passing along the present-day via Garibaldi and via Mazzini (Fig. 8).[106] This artificial canal was buried in the twelfth century following the new north-westward expansion of the city, but in the first stage of the settlement it was also a second defensive line alongside the *castrum*.

[101] *Ibid*.: 361.
[102] Chapter 1.2. note 26.
[103] Stefani – Zuppiroli, 'The interaction': 361.
[104] Rucco, 'Comacchio': 27-38.
[105] Stefani – Zuppiroli, 'The interaction': 357-362.
[106] Librenti – Negrelli, 'Le indagini': 111; C. Guarnieri, 'Una indagine nel centro storico di Ferrara: lo scavo di via Vaspegolo – corso Porta Reno (1993-94)': 246; Id., 'Ferrara, corso Porta Reno 22-28. 1993', *Archeologia medievale* 21 (1994): 409.

The area was, therefore, ideal in terms of transport and movements, and was also a crossroads for both river and terrestrial networks in both east-west and north-south directions. Last but not least, Ferrara's territory near the river provided agricultural and economic resources, considering that the area was largely cultivated in the previous Roman and late antique periods, and rich in underground fresh water.[107]

The growth of Ferrara was then closely dependent on its site's environmental conditions, to the point that – especially in its early decades – the growth of the settlement followed the Po northern levées, as far as it has been possible to evaluate from the archaeological evidence.

First archaeological evidence in Ferrara and its territory

All three traditions on its origins agree in considering Ferrara and its growth as a fortified centre as an early medieval phenomenon. From the archaeological point of view, this early medieval origin is not difficult to understand. In fact, very little archaeological evidence and no texts are available regarding Ferrara and its territory for the first centuries of the first millennium. After the demise of Spina, no important centre seems to develop in the entire delta area, as evidenced by archaeological data. As is documented by the *Carta Archeologica* for the Ferrarese, the landscape seems to be dominated by farms and scattered settlements, all located along river levées and ridges.[108] Two *vici* are recorded in the texts in the area near Ferrara: *Varianus* (Vigarano Mainarda) and *Ventia* (Voghenza). In the first half of the fifth century, Voghenza became a diocese dependent on the new metropolitan church of Ravenna, the new imperial capital city after Milan.

This territory was, however, vital for the navigation networks, connecting the Adriatic lagoon and the Po since Roman and pre-Roman periods. The "romanisation" of the delta led to the creation of several *fossae* (canals) with different river stopping points (*stationes*), one of which was close to Ferrara, and is mentioned in a stele of the Ravenna navy *classiari*, discovered at Quacchio (FE).[109] Parallel to the navigation system the road network seems to develop, perhaps on the levées as attested by a milestone of the fourth century emperors Valens and Gratianus east of Ferrara.[110] Unfortunately, this later section of Roman road has left very few – if no – traces in the archaeological record compared to the earlier Roman roads.

---

[107] Stefani–Zuppiroli, 'The interaction': 369.

[108] Uggeri, *La Romanizzazione*: 171; Id., 'Insediamenti, viabilità e commerci di età romana nel Ferrarese', *in Storia di Ferrara 3/1* (Ferrara 1989): 1-202; Id., *Carta Archeologica del Territorio Ferrarese, Foglio 76 (Ferrara)* (Galatina 2002).

[109] Id., *Carta Archeologica:* 208; Id., 'La nascita di Ferrara: il quadro topografico e storico', in *Anno 413*: 10.

[110] Id., 'La nascita': 12.

At the beginning of the early middle ages, the area in which Ferrara was settled had a low population density but was also a strategic location for movements on inland waters, and an advantageous place to cross the Po. Here, in fact, it was possible to cross the Po with just one ferry, with no need to cross other branches as it was downstream in the core of the delta, or upstream with all the tributaries.[111] The ferry was also favoured by the presence of the river islands of Belvedere and Sant'Antonio in Polesine.

According to the most widely held viewpoint, the delta and the area of Ferrara grew in importance with the fluctuation of the frontier between Lombards and Exarchate.[112] At the beginning of the seventh century, Ravenna was facing the advance of the Lombards and for this reason it was necessary to fortify its northern and western territories, especially those sites in proximity to the river which were crucial for movements. In this context, the hypothesis of a Byzantine founded *castrum* in the area of Ferrara is not so improbable, especially if we compare with the situation of other better documented sites in the delta area like Voghenza or Comacchio.[113]

Nevertheless, in order to avoid generalisation, it is important to consider the material evidence and check how much of this hypothesis can be verified. First of all, there is very little archaeological evidence for the Ferrarese between the sixth and the eighth century. The scanty archaeological evidence suggests that the pre-Roman and Roman settlement of Bondeno along the Burana and Panaro rivers seems to have almost disappeared and the silence of the written sources for all the sixth and seventh century does not provide a clearer picture.[114] The situation is similar for the already mentioned *vicus Varianus*, which seems to be abandoned between the sixth and the ninth century, but re-emerges in the written documentation as an important crossroads in the tenth century.[115] In the western part of the site at which Ferrara was later established, there is evidence for the presence of Roman *villae*, production and storage places for agricultural activities – testified by some amphorae – and a few burials. In the eastern part of the Ferrarese – in the delta area – the situation was not much different: rare traces of settlements have been found along the watercourse levées (particularly along the Padovetere) – where Roman settlements like Senetica, Vigarano Pieve, Porotto, Cassana, Mizzana, Ferrara, Cona, Codrea, Quartesana, Voghenza, Gambulaga, Verginese, San Vito, Dogato, Libolla e

[111] *Ibid*.: 12.
[112] *Ibid*.: 10-12.
[113] Patitucci-Uggeri, *Carta archeologica*: 28-32.
[114] *Ibid*.: 32. Interesting data for the rural exploitation of Bondeno and its territory will be analysed in Chapter 4.2., see C. Frison, 'Bondeno tra alto e pieno Medioevo', in F. Berti *et al*. (eds.), *Bondeno e il suo territorio dalle origini al Rinascimento* (Casalecchio di Reno 1988): 307-318.
[115] Patitucci-Uggeri, *Carta archeologica*: 33.

Ostellato seem to maintain a feeble continuity – and along the coastal dunes, the route of the Roman *via Popilia*, linking Ravenna and the Venetian lagoon.[116]

The first nucleus of Ferrara must therefore have been established in a strong rural context. Starting from the 1970s, excavations have been carried out within Ferrara, providing enough elements to formulate interesting hypotheses on the formation of the river settlement. Important excavations have been undertaken in the Casa del Capitano,[117] allowing the so-called *castrum* to be investigated, and especially in the large site of Corso Porta Reno – the first urban stratigraphic excavation in Ferrara – started in 1981 but not yet entirely published.[118]

The first excavations in the Casa del Capitano courtyard brought to light a brick wall, 1.06 metres wide and 2.1 metres in height, oriented east-west. In its eastern tract the course of the wall seems to continue along the line of an earlier palisade. The excavators concluded that these wooden structures and the reused trachyte flagstones were the base on which the brick wall and the Byzantine *castrum* were built, following the tradition concerning Smaragdus' foundation of Ferrara.[119] The high point, at which this *castrum* developed, was surrounded by a paleo-channel – as shown in Fig. 8 – and the wooden piles are likely a foundation structure in order to stabilise the ground for the construction of the fortification. The dimensions of the wall and the layout of the streets, which are still evident, suggest that the fortified area also seems to have been planned following the Byzantine measurement system.[120] The *castrum* ferrarese so-defined in the 1970s is one of a series of fortifications quite common in the Po valley: they were lightly fortified castles, with a surface area of one or two hectares and located near large burial sites.[121]

Re-evaluation of the previous evidence from the Casa del Capitano and more recent excavation at the site of Porta Corso Reno, has led to a different interpretation for the wall and in general regarding the original settlement of Ferrara, which partially finds confirmation in the written documentation. According to the most recent studies, it seems that the *castrum* does not fit completely with the description made at the beginning of the 1970s. A first substantial difference compared to similar cases in the Po valley is the presence of churches (in this case San Pietro) within the defensive perimeter – as has been highlighted by Mauro Librenti and Claudio Negrelli.[122] Not only does the location of the church seem to indicate a different settlement structure compare to other late antique Po valley fortified sites, but also its position

[116] *Ibid*.: 34.
[117] Patitucci Uggeri, 'Un'evidenza': 85-92.
[118] For previous bibliography see also Guarnieri–Librenti, 'Ferrara': 275-307.
[119] Patitucci-Uggeri, 'Il *castrum*': 9; Id., 'Un'evidenza': 85-92.
[120] *Ibid*.: 10.
[121] Librenti – Negrelli, 'Le indagini': 110–111.
[122] *Ibid*.: 110.

on the levée peak seems not to be uniform: the area occupied by the *castrum*, in fact, does not fit completely with the altimetric disposition, and slightly slopes two metres downwards to the southern side. Librenti and Negrelli also emphasise that it is very possible that the high ground is artificial, and probably dates from the late middle ages.[123] One possible explanation could be the creation of an artificial waterfront close to the settlement, which finds support in the crucial role that Ferrara had in the Po navigation network.

Moreover, two important excavations in Corso Porta Reno have helped in the construction of a proper stratigraphic sequence. The maximum depth of excavation in the area, recognising specific layers, is four metres. In these strata, most finds relate to central and late medieval contexts, and the first three metres relate to materials from the tenth to thirteenth century.[124]

Not only there are no definite layers that refer to the period before the tenth century in the area in proximity of the *castrum*, but also the material found at the Casa del Capitano do not seem to provide a sure chronology for the late antique Byzantine centre – as noted by Sauro Gelichi.[125] The chronology, initially proposed in the 1970s, was based mainly on four elements: soapstone, amphorae, reuse of trachyte flagstones and the Byzantine measurement system. This evidence led Stella Patitucci-Uggeri to identify the wall in the Casa del Capitano as the Byzantine *castrum* founded as a result of Smaragdus' defensive policy in the delta area. However, all these indicators, even if they highlight a strong link with the exarchate and the Byzantine sphere of influence in general, are not precise enough to support the hypothesis that an early seventh century Byzantine fortification was built in Ferrara. As noted by Gelichi, soapstone does not have a precise chronology, and is generically datable to the early middle ages and not only to the first half of the seventh century. The amphora fragments found do not seem to be an early medieval product, indeed their chronology – also considering their similarity to other fragments found in the Ferrara area – relates to a period not before the eleventh century. The reuse of flagstones for the wall foundations in the Casa del Capitano does not link the chronology of the structure to the seventh century, considering that similar materials were used, especially in the late middle ages. Similarly also the Byzantine urban planning units based on the *orgyia* recognised in the construction of the wall, were applied to other structures, at least until the Byzantine reform by Michel IV Paphlagonian in the first half of the eleventh century – as Patitucci-Uggeri herself recently emphasised.[126] The revision of the evidence by Gelichi and its comparison with the large availability of data for Comacchio seem to indicate that

[123] *Ibid*.: 110-111.
[124] *Ibid*.: 111.
[125] Gelichi, 'Hodierni': 8-9; Id., 'Il Castello': 15-21.
[126] Patitucci-Uggeri, 'Il *castrum*': note 18.

a masonry fortification was not constructed before the tenth-eleventh century,[127] significantly later compared to the 1970s interpretation and in line with the general findings of the excavations in Corso Porta Reno.[128]

The two different explanations for the supposed *castrum*, however, do not seem to change matters as regards the very first settlement in the area of present-day Ferrara. In fact, it has been recently remarked that the first nucleus in the *castrum* area was probably a settlement that grew up around the church of San Pietro, with a dozen wooden houses with stables and a wooden fence, found in the Casa del Capitano excavations.[129] 700 metres north-west of this first settlement, near to the church of San Michele and its paleo-channel – probably still subject to river flooding events -, there seems to be a stable second settlement since late antiquity, even if we do not have much evidence for it apart from a few pottery finds.[130] The two settlements seem to be the first two points between which the early medieval proto-urban fabric developed between the sixth and the eighth century. In fact, in this rectangular area of 100x150 metres bounded by the *castrum* high-ground (south-east), the San Michele paleo-channel (north-west), its continuation through the modern via Garibaldi, via Contrari and via Semola (north-east) and the early medieval Po (south-west) – along the present day via Mazzini – a regular division of the urban fabric has been observed following the Byzantine measurement system of the *orgyia* as seen in the *castrum*'s area.[131]

The development of the *castrum* with stone and brick walls, however, is an important step for the settlement that started in the early middle ages with a *terminus post quem* in the twelfth century. Unfortunately, archaeology cannot yet say any more about early medieval Ferrara apart from recognising the presence of a growing settlement on the Po's northern levée at the crossroads of water and land routes between the delta area and the Po inland course of the Emilia and Veneto low plains. This settlement seems to grow at the end of the ninth century and especially from the tenth, leading to the suspicion that – at the end of the early middle ages, during the Carolingian period – the reality of Ferrara was very modest even if its location, in one of the most important areas for communications in the Po valley, might suggest strong political and economic interest by the rulers of these lands. The real expansion of Ferrara as an urban

[127] Gelichi, 'Hodierni': 7-8. On Comacchio see specifically note 27.
[128] Guarnieri, 'Una indagine': 246.
[129] R. Dalla Negra *et al*., 'Ferrara: contributi per la storia urbana', in M. Bondanelli (ed.), *Problematiche strutturali dell'edilizia storica in zona sismica, contributi al seminario di studi, Ferrara, 1-22 ottobre 2009* (Ferrara 2009): 103-158. R. Dalla Negra *et al*., 'Le ricerche sulla città di Ferrara finalizzate alla sua conservazione: prime ipotesi attorno alla nascita e all'evoluzione del Castrum Ferrariae', in Id. (eds.), *Competenze e strumenti per il patrimonio culturale. Il caso del territorio ferrarese* (Ferrara 2010).
[130] Stefani – Zuppiroli, 'The interaction': 364.
[131] Patitucci-Uggeri, 'Il *castrum*': 11.

centre started at the end of the Carolingian era, probably taking advantage of the economic traffic on the Po, promoted by the Carolingian kings.

Even if archaeological evidence confirms the early medieval birth and growth of Ferrara, what can we see in the historical documentation? When is it possible to identify this settlement in the texts? What kind of information do we have on its role in the socio-economic and political scenario of the early medieval Po valley?

Ferrara and its texts in the early middle ages

The first mention of Ferrara in a document is relatively late, especially if compared to the hypothesis that the settlement was established between the sixth and the seventh century. The name of Ferrara appears for the first time in the *Liber Pontificalis* and in the *Codex Carolinus*, in a passage mentioning the same episode: after the Lombard conquest, Desiderius promises to Stephan II in 757 to return the centres of Faenza, Bagnacavallo, Gavello and the so-called *ducatus Ferrarie* to the pope.[132] Both these texts report this fact and mention the duchy of Ferrara, but it is unfortunately impossible to reconstruct its size and political importance.

Considering that it is problematic to rely on narrative sources for precise details, we have to wait almost a century to find a mention of Ferrara in a legal document. A very brief mention is in a *placitum* in 834,[133] in which the *dativus* Gregorius de Ferraria may indicate not only the presence of a settlement, possibly north of Ravenna and south of Rovigo – as the text suggests –, but also the circulation of 'educated' people from Ferrara in the first half of the ninth century. Almost fifty years later, in 880 Charles the Fat, in a diploma issued in Ravenna for the doge Ursus, mentions the people of Ferrara as neighbours of Venice.[134] In the text – a copy of the fifteenth century – the identifiable terms are *vicini* (neighbours) and *Ferrarienses* (the people from Ferrara). The same terminology is used few years later in 888 by Berengar I in his *pactum* with the Venetians, which has survived in three copies of the fourteenth and sixteenth centuries.[135] In this case too, the people of Ferrara are indicated among Venice's neighbours, along with the people from Istria, Cividale, Ceneda, Treviso, Vicenza, Monselice, Padua, Gavello, Comacchio, Ravenna, Cesena, Rimini, Pesaro, Fano, Senigallia, Ancona, Umana, Fermo, Penne.

From this perspective it is interesting to note the specification of the inhabitants of Ferrara – and the other centres. The people of Ferrara were named and qualified as an individual entity, conferring on the settlement a juridical and political authority. In other words, at the end of the ninth century, the identity of the people who lived in Ferrara – either the settlement or the *ducatus* – was recognised in legal documents.

---

[132] L. Duchesne, *Le Liber Pontificalis*, I (Paris 1886): 455. For the *Codex Carolinus* see Epist. Karol. I, 8.
[133] *Placiti*, 43: 39-44.
[134] DD Kar III, 17: 26-31.
[135] DD Ber. I, 3: 13-25.

At the end of the ninth century, Ferrara is mentioned in two other documents: in an original diploma of Guy of Spoleto of 891 and in a sixteenth-century copy of a donation made in 896 by the countess Ingelrada to her son Peter, a deacon of the church of Ravenna. The most interesting document is perhaps the first, which is sort of unique for its type. In fact, in Ingelrada's donation, Ferrara is mentioned as a geographic reference for certain properties,[136] but in Guy of Spoleto's 891 diploma the settlement along the Po is mentioned as the place of issue. The diploma concerns some concessions of properties by the emperor to his man Thietelmo in the Tuscan Apennines.[137] Even if the contents of the diploma are not very useful for the analysis of early medieval Ferrara, the fact that it was issued at this settlement is again indicative of certain importance. Why was the emperor in Ferrara in November 891? What was his purpose there, a place that apparently was surrounded by swamps and marshes and never explicitly mentioned in previous charts? In trying to find a reason for Guy's presence in Ferrara we have to reconstruct the emperor's itinerary during those months. According to the edition of Guy of Spoleto's diplomas by Luigi Schiaparelli, if we look at the places of issue of the previous diplomas, we note that after coming back from Rome in the first months of 891 – after his coronation as emperor – Guy stayed in Pavia for almost the whole summer. In November, however, he decided to move east and, according the original documents, we know that on the 22nd of November the emperor was in its villa in Legnago, near Mantua.[138] Two days later, on the 24th, he issued the diploma in Ferrara (*Ferraria*). In spring 892 the emperor was in Ravenna and eventually in Milan, concluding his journey in Pavia.[139]

The itinerary of Guy in the Po valley at the end of the ninth century, in a period tormented by civil wars for the crown of the kingdom of Italy, suggests that the emperor was in those places for specific reasons. As well as providing us with a good example of journey times in a difficult environment (the Mantua-Ferrara trip, possibly by both road and waterway, took two days), Guy's itinerary implies two important aspects: 1) Ferrara must have had at that time suitable buildings and structures to host the emperor and his court, 2) there was a specific reason why Guy decided to stop at Ferrara, and probably at other centres nearby before moving on to Ravenna. Even if it is impossible to know the real reason for Guy's journey in the low plain (it could have been for diplomatic reasons, considering the fact that he made concessions of

[136] R. Benericetti, *Le carte ravennati dei secoli VIII-IX* (Bologna 2006), 54: 124-126. For Ingelrada land holdings see N. Mancassola, 'La grande proprietà fondiaria nel territorio dell'antico Esarcato di Ravenna (secoli IX-X)', in J.M. Martin *et al*., *L'héritage byzantin en Italie (VIIIe-XIIe siècle), IV, Habitat et structure agraire* (Rome 2017): 119-144.

[137] L. Schiaparelli, *I Diplomi di Guido e Lamberto* (Rome 1906), 12: 32-34. We do not know much more about Thietelmo, apart from the fact that he was one of the most highly paid of Guy's *fideles*, and all his properties named in the diploma were located along the principal Apennine valleys connecting Florence and the cities of Emilia.

[138] *Ibid.*, 11: 27-32.

[139] *Ibid*., 13, 14: 34-38.

property for his *fideles*, or simply a sort of pleasure trip, maybe for hunting?), the fact that an emperor passed the first recorded time through Ferrara means that the centre was finally significant also for crown business, perhaps given the centrality of Ferrara in river and land routes.

With the tenth century, the presence of Ferrara in written documents increases. In contracts between peasants (*coloni*) and local lords, the *territorium* of Ferrara is often mentioned as the location of specific properties.[140] According to the texts, it is only possible to find mention of the settlement as a *civitas* in 967, in a diploma issued by Otto I in Ravenna. From this point, it is possible to imagine a settlement in Ferrara with a proper civic identity institutionally recognised and associated to its specific territory. In the same period, Ferrara had recently been described in a written text as a *castrum*. Even if the tradition that the origin of Ferrara was as a Byzantine fortification suggests that *castrum* was an appropriate label for the seventh century settlement, the term appears for the first time only later in the tenth century, not even in a royal diploma but in John the Deacon's *Chronicle of Venice*.[141] If we compare John Deacon's usage in his *Historia*, the term *castrum* is used to describe other important places in the delta area such as Comacchio.[142] Although the settlements and the descriptions were quite different in many aspects, the use by the same author of the same term highlights the importance that Ferrara had at the time when John Deacon wrote and its characterisation as a militarised centre, able to resist enemy assaults.

In the second half of the tenth century, the texts start to mention more specifically buildings and neighbourhoods within the urban fabric, meaning that Ferrara seems to be larger than previously, and this is confirmed by archaeological finds. For example, a *platea publica major,* a triangular market square, is mentioned in 972 and was partially recognised in archaeological fieldwork which found crevasse deposits and anthropic evidence that seems to attest a fast surface build-up.[143] Another index of growth is the mention in the tenth century of several new churches, almost a parallel with the growth in church numbers noted in Pavia and Piacenza.[144] The proliferation of new churches seems to be focused on three main areas: west of the first nucleus apart from San Michele – already mentioned – we find Santa Giustina and

[140] See N. Mancassola, *L'azienda curtense tre Langobardia e Romania. Rapporti di lavoro e patti colonici dall'età carolingia al Mille* (Bologna 2008): 215.
[141] Between Christmas 997 and the first months of 998, the emperor asks the doge Pietro Orseolo: «suum filium ultra Ferrariense Castrum sibi obvium mittere non recusaret», John the Deacon, 'Cronaca Veneziana', in G. Monticolo (ed.), *Cronache veneziane antichissime* (Roma, 1890): 154. To be fair, a *castello* (castle) is mentioned in Ferrara in the Chronicle during the time of the doge Pietro Candiano (959-977): «*Ferrariensi quippe castelli populum potentissime debellavit*», *Ibid*.: 139.
[142] See above note 24-25.
[143] Bocchi, 'Ferrara': 138, note 157. For archaeological reference see Stefani – Zuppiroli, 'The interaction': 364.
[144] *Ibid*.: 364-365.

Sant'Agata, probably sited in the area of the late medieval papal fortress which now covers them. Two churches, Sant'Apollinare and San Vitale, were also built east of the original nucleus (see Fig. 8).

As Francesca Bocchi noted, these churches may be distinguished according to three different dedicatory traditions. Within the first settlement, the churches are dedicated to saints of Roman origin like San Pietro or San Martino; in the western area, churches are named after saints that were quite important for the Lombards, while in the eastern neighbourhood, the lost churches of Sant'Apollinare and San Vitale are dedicated to saints that are typical of the Ravennate tradition.[145] This division of Ferrara by dedicatory tradition could also be seen as a good guide for further archaeological investigations that might focus on specific neighbourhoods, structured (perhaps) following an ethnic distinction, a quite common pattern in other centres of the Po valley. In the light of this division of the urban fabric, it is possible to imagine two ethnic "cantons" in the settlement along the river levee, perhaps with their own ports and mooring spaces, facilitating access to the town from the river directly into their respective areas: Lombards from the central Po valley and Byzantines from the Primaro and Volano branches.

In this layout of urban – or suburban – churches a specific focus was needed for the episcopal see. The already mentioned church of San Giorgio, the new cathedral replacing Voghenza, was probably built between the seventh and eighth centuries outside the probable city perimeter at the junction between the Po of Volano and the Po of Primaro (Fig. 8).[146] The church as cathedral starts to be archaeologically and historically well documented only in the mid-tenth century and is the most important ecclesiastical building until the construction of the new cathedral in 1135.[147] However, there is no clear evidence in the charters for the presence of an episcopal see in Ferrara before this period. In fact, one of the characteristics of the bishop of Ferrara is his association throughout the early middle ages with the see of *Vicus Habentia* (Voghenza), the original episcopal centre in this area. The very few mentions of Ferrara's bishops at the end of the early middle ages always have the epithet *ferrariensis et/seu vicohabentinus*.[148] In an emphyteusis dated in March 965, Martin is named as 'autonomous' *episcopus ferrariensis*,[149] but we have to wait until the end of the eleventh century for the complete disappearance of the adjective referring to the old Roman centre of Voghenza. Archaeological

[145] Bocchi ('Ferrara': 134) writes of a Byzantine origin for San Pietro and San Martino but I think it is more appropriate to talk about a west-Roman tradition.
[146] A. Benati, 'Il trasferimento della sede vescovile da Voghenza a Ferrara: problemi ed ipotesi', *Analecta pomposiana* 25 (2000): 53-59.
[147] Stefani – Zuppiroli, 'The interaction': 364. The first mention of San Giorgio as Cathedral is in 936, I. Marzola, *Le carte ferraresi più importanti anteriori al 1117* (Città del Vaticano 1983): doc. 3: 20.
[148] Gelichi, 'Hodierni': 9.
[149] R. Benericetti, *Le carte ravennati del secolo X* (Bologna 1999), 118: 80-82.

evidence in Voghenza confirms the use of the site for liturgical purposes throughout the early middle ages until the ninth century. On the contrary, in Ferrara material evidence for the effective presence of a bishop is quite scarce and uncertain,[150] especially before the foundation of San Giorgio.

From this perspective, the growth of Ferrara as a strong and important centre in its territory starting from the tenth century is also shown by the independence that its bishop obtained, compared to the slow but inexorable decline of its neighbour. The consolidation of a proper episcopal see in Ferrara highlights how this centre rapidly increased in importance and – possibly – size especially after the Carolingian dominion in northern Italy. The foundation of the first episcopal church on the junction between the two branches of the Po delta could also be seen as sign of the importance that the river had for everyday life of Ferrara and – perhaps – precisely for its growth and later wealth.

Early medieval Ferrara and its waters: a river city origin?

In concluding this discussion, it has been possible to understand the close relationship that Ferrara developed with the Po, keeping in mind some crucial points emerging from the different data that have been outlined in these pages. This connection show that early medieval Ferrara was expression of both the concept of amphibious culture and river city, representing perhaps the best early medieval urban case in the Po valley in which these theoretical concepts find a material example.

Firstly, as previous studies have already highlighted,[151] the role exercised by watercourses in the formation of the initial settlement is crucial. Even if it is not completely clear how Ferrara, in the first part of its life, was connected socially and politically with its territory, the original site and its later development show evidence of a perfect appropriation of the surrounding environment. The siting of the first agglomeration at this location was far from random and was related to geographic advantages that these northern levées provided in terms of defence against floods and more freedom in movement along the road developed on the high ground.

Before seeing the political advantage of this site for the Byzantine exarchate, it is important to stress that also for locals, the site of Ferrara represented *per se* a perfect base on which to settle. Especially after the abandonment of the Roman infrastructures, the levées were the best place to settle for the people living in the area. The arguments that link the birth of Ferrara and its rapid growth to the Byzantine necessity for a defended border must be taken

[150] For the comparison between the materials found in Voghenza and Ferrara see Gelichi, 'Hodierni': 9-10.

[151] «La ragione principale dell'esistenza di Ferrara è il Po», Bocchi, 'Ferrara': 125

carefully, avoiding generalisations. The Roman and Byzantine presence is archaeologically documented, but it was much less evident compared to other centres in the delta area – like Comacchio, Voghenza or Argenta.

Another argument against Ferrara's origin as a seventh century Byzantine *castrum* is the lack of mentions of the place in these terms in contemporary sources of the period. In particular, it is strange that in the most important narrative sources for the events of the eighth century, Paul the Deacon and Agnellus, do not mention Ferrara at all in their works. Both are quite precise in describing fortified settlements along the Lombard-Byzantine border, and so the lack of any mention of Ferrara as one of these defensive settlements could be important for the question of its origins.

Nonetheless, the connection that the locals wanted to develop with the river since the first settlement is undoubtable. Apart from the proximity itself to the watercourse, a good indication of this is the location of the first episcopal church, exactly at the junction of the two courses of the Po that seem to have developed at the beginning of the eighth century after the drastic reduction of the Po of Spina. The lack of archaeological evidence for the first settlement around San Giorgio does not help and should induce caution. However, it is interesting to note that San Giorgio has a very singular location: even if the church was almost contemporary with the first settlement on the northern Po levée, it was *de facto* separated from the settlement, becoming another point of attraction for locals and *navigantes* on Po waters. Perhaps San Giorgio could be interpreted as an emanation of the northern settlement – the centre of the so-called *ducatus* (?) – in its territory, highlighting its ambitions to control the surrounding territory, but – unfortunately – the data in our possession so far do not allow us to formulate any more than hypotheses.

A second important point to stress concerning Ferrara is the growth that the settlement had during the last centuries of the early middle ages, a process – again – deeply linked to the resources provided by the river. Ferrara's urban development in both physical and economic terms can easily be explained by the Po. This is the most important characteristic for the definition of a river city or town, and is shared by all the other cases in the Po valley – as has been shown –.[152] However, in fact we have no real archaeological and historical evidence or confirmation of waterfront structures until at least the eleventh century. Certainly, mentions in the later documents and the geographical location of Ferrara could easily induce us to think that harbours and moorings were possibly distributed all along the north bank, and were especially connected to the market places that developed later in the middle of the 10th century town. Unfortunately, the only evidence that we have consists in the spread and development of

[152] See above Chapter 3.1.2.

Ferrara itself, following the contour line on the levée and at some points – as in the area close to the San Michele paleo-channel – in very close connection with the watercourses. Such locations are perhaps the most likely points at which those waterfront structures could have been settled. In this sense the link between the eighth/ninth-centuries developments of the settlement and the Po is still evident.

Finally, a last aspect to highlight concerning early medieval Ferrara is that its success as a strategic centre for political and economic ambitions was only consolidated after the Carolingian period. In this sense, the texts reflect the archaeological evidence for Ferrara: the city started to acquire a proper dimension only at the end of the ninth century, given its position at a fundamental section of the Po navigation system, connecting the delta and coastal network with the inland cities and markets.[153] Moreover, the fortification in stone and bricks of the *castrum* on the Po's north levée could be seen as a confirmation of Ferrara's later development as strong control and junction point established between the ninth and the tenth centuries and expanded in the later decades, perhaps following the trend of *incastellamento* throughout northern Italy in the post-Carolingian period. But more solid evidence is necessary to verify this hypothesis.

On the other hand, the relations established between Ferrara and its powerful neighbours are more indicative. There is no doubt that the constant decline of Comacchio not only favoured Venice's growth in the Adriatic, but also allowed the development of more inland centres like Ferrara. Moreover, the interest that the Ravenna church had for the sphere of influence of the Ferrara diocese is certainly a reflection of the importance that the new river city obtained at the end of the early middle ages. The Ravenna metropolitan church continued its policy of extending its influence in its northern territory trying to establish its power at economically strategic points – as in the case of the monastery of Santa Maria of Pomposa near the Po of Volano mouth –[154] but did not always succeed in the attempt, coming into conflict with other strong episcopal powers like Comacchio. In this policy the new important river centre of Ferrara represented a quite good opportunity and, in this context, the proliferation of properties in Ferrara's *territorium* linked to the Ravenna church could be seen as a manifestation of this strategy.[155]

In conclusion, in particular in the light of the lack of archaeological and written evidence for Ferrara in the first centuries of the first millennium, it seems plausible that not only was Ferrara born as an early medieval settlement, but also that its original role has to be linked to

[153] See Chapter 4 on these networks.
[154] C. Mezzetti, *Le carte dell'archivio di Santa Maria di Pomposa (932-1050)* (Roma, 2016): X.G. Ferraresi, 'S. Maria di Pomposa tra acque e terre (secoli IX-XI)', *Quaderni del MAES* 7 (2004): 37-56.
[155] On this topic see Mancassola, *L'azienda curtense*: 63-68.

the river and to the period that saw its growth: the period between the eighth and tenth centuries. In fact, even if the site location has a strong potential for the control of the river tract and those people and goods that were in transit there, it is only after the creation of a more stable network connecting the Adriatic coast and the inland course of the Po that Ferrara found its primary function. Ferrara as a river city was therefore deeply linked to the control of the river traffic, as the central medieval developments in terms of market and tolls station show.[156] Before the creation of that traffic – both from historical and archaeological points of view – Ferrara was just one of the river settlements that populated the countryside. As consequence of its strategical position and the opportunity presented by the river and its networks, alongside the initiative of the local social fabric, this centre eventually developed into one of the most important river city until the later centuries of the middle ages, and a clear representation of the amphibious culture.

[156] For example, in the eleventh-century Ferrara is mentioned as one of the termini of the river navigation for the *naves* of the monastery of Novalesa: C.M. Cipolla, *Monumenta Novaliciensia I* (Rome 1898) 58, 62, 75, 10a.

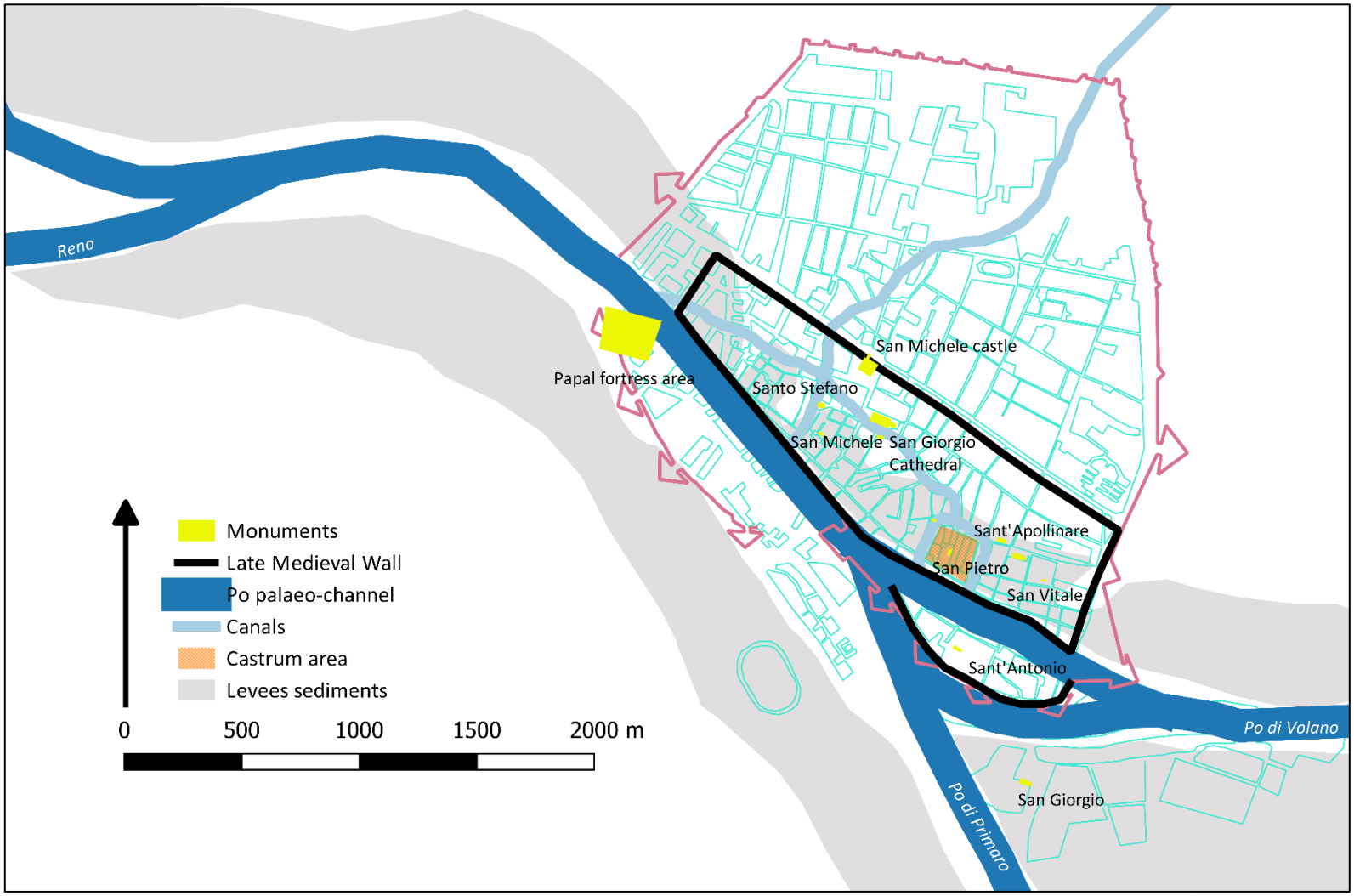


Fig. 8, Early medieval Ferrara, after Stefani – Zuppiroli, ' The interaction': 359-366, Librenti – Negrelli, 'Le indagini': 111 and Patitucci-Uggeri, 'Il *castrum*': 19

3.2. Rivers, water and the countryside

Not only were cities conditioned by the presence of rivers and watercourses, but also the early medieval countryside was seriously affected by instable hydrology, especially in the area from Cremona to the delta.[157] In this section of the chapter the relationship between the Po, its tributaries and other secondary watercourses, and the formation, distribution and development of rural settlements in the eighth and long ninth century will be analysed. The aim is to identify the principal characteristics of this relationship and thereby to verify how the concept of *amphibious culture* can be applied to early medieval northern Italy and its rural society.

Originally, study of the Po valley countryside was negatively conditioned by the eighteenth-century perception – well-expressed by Ludovico Antonio Muratori – in which the landscape, especially in the early middle ages, was largely dominated by woods, swamps, and *incultus*, with some rare villages characterised by a poor and ephemeral material culture compared to the glorious Roman past.[158] During the last century, however, this pessimistic view was largely reassessed, especially thanks to the work of Vito Fumagalli. Following the call for a new history of Italian agriculture by Gina Fasoli during the fifth *Settimana di studi* of Spoleto in 1958, Fumagalli started to formulate a new picture of the rural landscape, different from the Roman and late antique past but more complex: in his view, the economic exploitation of the *incultus* was crucial to socio-economic life of the time.[159] New and different economies and administrations were formed in Italy, and in the Po valley the link with water was particularly evident since the beginning of these studies.

Following the example of Fumagalli, other works were published concerning the analysis of the countryside like those of Andrea Castagnetti,[160] who focused more on the political-institutional aspects. In the same years, Paola Foschi, Gianfranco Pasquali, Bruno Andreolli and Massimo Montanari also started to investigate the economic management of the countryside, elucidating territorial divisions, activities that were carried out by the locals, and demographic distribution.[161] Important new archaeological papers also started to be published in the 1980s,

[157] See Chapter 1.

[158] L.A. Muratori, *Antiquitates Italicae Medii Aevi II/XXI* (Milan 1739): 144-288.

[159] G. Fasoli, 'Aspetti di vita economica e sociale nell'Italia del secolo VII', in *Settimane* 5 (1958): 133. For a historiographical account of Italian agricultural history of the middle ages before the advent of Fumagalli see A. Castagnetti, 'La storia agraria dell'Alto Medioevo nel Novecento fino ai primi contribute di Vito Fumagalli (1966-1971)', in P. Nanni (ed.), *Agricoltura e ambiente attraverso l'età romana e l'alto Medioevo* (Florence 2012): 41-65. For Fumagalli see 'Note sui disboscamenti nella Pianura Padana in epoca carolingia', *Rivista di Storia dell'Agricoltura* 7/2 (1967): 139-146, Id., *Terra e società*.

[160] A. Castagnetti, *L'Organizzazione del territorio rurale nel medioevo. Circoscrizioni ecclesiastiche e civili nella "Langobardia" e nella "Romania"* (Torino 1979).

[161] P. Foschi, 'La presenza dell'Incolto nel territorio bolognese nei secoli VIII-X', *Rivista di Storia dell'Agricoltura* 18 (1978): 91-105. G. Pasquali, 'Le forme dell'organizzazione del territorial rurale nella Pentapoli altomedievale', *Atti e Memorie della Deputazione di Storia Patria per le Marche* 86 (1981): 647-

especially by Gian Pietro Brogiolo, Riccardo Francovich and the school of Siena, and Sauro Gelichi.[162] Consequently, the overall idea that developed during the 1990s from the first discussions between historians and archaeologists – well expressed by Chris Wickham during the congress of Pontignano near Siena – was the recognition that the study of the early middle ages without the constant dialogue between the two disciplines would be impossible.[163]

It is in this context that the study of the relationship between man and water in the early medieval countryside in Italy moved its first steps. At the beginning of the new millennium, the publications of two first archaeological overviews on the sites of Sant'Agata Bolognese in Emilia and Piadena in Lombardy, both presented at the congress of Nonantola and San Giovanni in Persiceto in 2003, focused scholars' attention more directly on those settlements located in proximity of watercourses and rivers.[164] Apart from the already mentioned studies on the lagoon and delta settlements (Chapter 3.1.2), research on the relationship between rural settlements and watery environments finally began for two areas of the Po valley: the Lombardy-Veneto low plain, between the Adda and the Adige rivers, and Emilia.[165]

Research on this topic was subsequently continued especially by the new generation of scholars led by Fabio Saggioro, who focused his early research on the territory of Verona (the *Veronese*), and Nicola Mancassola, more interested in the rural settlements-river dynamics in the Emilia and Romagna low plains. Both initially based their research mainly on surveys in areas that were characterised by strong geomorphological and hydrological instability in the period between the sixth and the tenth centuries. Their first joint work was published in 2001,[166] in which the relationship between rural settlements and wetlands were still quite marginal to the general discussion. In 2006, with the publication of the volume *Medioevo, Paesaggi e Metodi*,[167] more contributions were proposed, in particularly as regards the methods that could be used to

682. B. Andreolli – M. Montanari, *L'azienda curtense in Italia. Proprietà della terra e lavoro contadino nei secoli VIII-XI* (Bologna 1983).

[162] G.P. Brogiolo, 'Le campagne dalla tarda antichità al 900 ca. d.C.', *ArchMed* 10 (1983): 89-110
R. Francovich – M. Milanese (eds.), 'Lo scavo archeologico di Montarrenti e i problemi dell'Incastellamento medievale. Esperienze a confronto, Atti del colloquio internazionale (Siena, 8 dicembre 1988)', *ArchMed* 16 (1989): 7-288. S. Gelichi (ed.), *Archeologia e insediamento rurale in Emilia-Romagna nel medioevo. Contributi per una ricerca* (Bologna 1991).

[163] C. Wickham, 'Considerazioni conclusive', in R. Francovich – G. Noyé (eds.), *La storia dell'altomedioevo italiano (VI-X secolo) alla luce dell'archeologia* (Florence 1994): 741–759.

[164] S. Gelichi – M. Librenti, 'Un villaggio fortificato dei secoli centrali del medioevo nei pressi di S. Agata Bolognese (BO)', in S. Gelichi (ed.), *Campagne medievali: Strutture materiali, economia e società nell'insediamento rurale dell'Italia settentrionale (VIII-X secolo)* (Mantova 2005): 101-117. G. P. Brogiolo – N. Mancassola (eds.), 'Scavi al Castello di Piadena', in Gelichi (ed.), *Campagne medievali*, 121–220.

[165] S. Gelichi *et al*., 'La transazione dell'Antichità al Medioevo nel territorio dell'antica Regio VIII', and F. Saggioro, 'Insediameti, proprietà ed economie nei territori di pianura tra Adda e Adige (VII-X secolo)', in G.P. Brogiolo *et al*. (eds.), *Dopo la fine delle ville: le campagne dal V al IX secolo* (Florence 2005): 53-80 and 81-104.

[166] N. Mancassola – F. Saggioro, 'Insediamento rurale e campagne tra tarda antichità e altomedioevo. Territori tra Verona, Brescia e Mantova', *AnTard* 9 (2001): 307-330.

[167] N. Mancassola – F. Saggioro (eds.), *Medioevo, paesaggi e metodi* (Mantova 2006).

analyse difficult landscapes like those in the Po valley. In the same year Saggioro, in another article, emphasised the importance of this topic for a better understanding of early medieval settlement patterns and their development compared to the late Roman period.[168]

More recently, research in this field has greatly benefited from and followed the impact of specific excavated sites – especially Nogara and Sant'Agata Bolognese –[169] that provided a more concrete basis for discussing the material aspects of the link between human presence, inland water and river. Simultaneously, surveys and fieldwork have continued; these have been integrated with written documents and facilitated the development of a strong interdisciplinary approach for the study of the settlement patterns in wetlands.[170] New areas have been studied – like the recent work by Brogiolo on the lower Adige valley, a landscape affected by several hydrological mutations – confirming the strong link between early medieval societies and wetlands in northern Italy and challenging the catastrophic view proposed by the first historians concerning the environment from the sixth century onwards.[171]

Overall, study of the direct link between rivers and rural settlements in northern Italy can be described as quite a recent historiographical topic, which has benefitted from new inputs provided by archaeological research. The results from a range of sites north and south of the Po provide an interesting and dynamic scenario, characteristic of the early middle ages and in contrast with the previous, traditional view of the medieval landscape.

The eighth and especially ninth centuries are considered by both historian and archaeologists to be a new stage in this relationship, in which a new balance was created as a result of the impact that particularly the Carolingians brought in the socio-economic system.[172] In defining this period as determinant, I would first consider the difference that Paolo Squatriti emphasised in 2008 and restated in 2010: he distinguished between the impact that the environmental changes had on the construction of a new landscape and the impact that these changes had in the formation of a 'memory' of that landscape.[173] This division is fundamental in

---

[168] F. Saggioro, 'Tra terra e acqua: problemi dell'insediamento e dell'ambiente nei territori di pianura', in *IV Congresso Nazionale di Archeologia Medievale* (Florence 2006): 206-211.

[169] F. Saggioro (ed.), *Nogara. Archeologia e storia di un villaggio medievale (Scavi 2003-2008)* (Rome 2011); S. Gelichi *et al.* (eds.), *Un villaggio nella pianura. Ricerche archeologiche in un insediamento medievale del territorio di Sant'Agata Bolognese* (Florence 2014).

[170] N. Mancassola, 'Uomini e acque nella pianura reggiana durante il Medioevo (secoli IX-XIV)', in D. Canzian – R. Simonetti (eds.), *Acque e territorio nel Veneto medievale* (Rome 2012): 115-132. F. Saggioro, 'Paesaggi in equilibrio: uomo e acqua nella Pianura Padana Centrale tra IV e IX secolo', *AnTard* 20 (2012): 47-67.

[171] G.P. Brogiolo, 'Insediamenti, chiese e porti lungo il basso Adige tra VI e X secolo' *HAM* 22 (2016): 417-430; Id., 'Flooding in Northern Italy during the Early Middle Ages: resilience and adaptation', *PCA* 5 (2015): 47-68. For the environmental issue see Chapter 1.

[172] Saggioro, 'Paesaggi': 65. In general, on the importance of the period see I.L. Hansen – C. Wickham (eds.), *The Long Eighth Century, Production, Distribution and Demand* (Leiden 2000).

[173] P. Squatriti, 'I pericoli dell'acqua nell'alto medioevo italiano', *Settimane* 55 (2008): 583-629; Id., 'The Floods': 799-826

the study of the relationship between rural settlements and wetlands, considering the possibility of different methodological approaches and interpretations, but especially to avoid falling into the same error of the past and not maintaining a distinction between the actual material impact and its perception by present-day and past societies. This was the principal error that led to the creation of the traditional catastrophic views concerning the early medieval landscape and also its "rescue" by the Carolingians and the monks.[174]

3.2.1. Rural settlements in wetlands: the main characteristics

In 2012 Saggioro formulated a first overview of research conducted in northern Italian rural sites in proximity of watercourses and wetlands.[175] Nevertheless, on that occasion some problems in the research on the relationships between wetlands and rural settlements already emerged.

A first aspect to consider was the type of material that has been analysed in the majority of rural sites. In the countryside archaeological research was mainly conducted by surveys and excavations focused on funerary evidence. In general, burials can provide good information on rural settlements: looking at their location in the countryside it is possible to understand specific occupation patterns especially on regional scales like distribution of the population, characteristics of the social groups and social mobility. However, burials provide limited information on the relationship between settlements and rivers: they do not information on waterfront structures, specific building techniques, or uses of local materials. Another research problem is the general difficulty of precise dating the sites. This is due especially to the lack of materials useful for this purpose – like coins or pottery – or their perishability – in particular of wooden structures – as Saggioro pointed out.[176] In addition, the general lack of specific written mentions of individual sites in the documentation does not facilitate the recognition and the analysis of many early medieval settlements and their diachronic evolution. A final issue was the odd assumption of the earlier research that water and wood were the only elements of the landscape in the early middle ages, an aspect that is now completely re-evaluated as highlighted in Chapter 1.[177]

Despite these research problems, the formation of new early medieval settlements in those areas largely covered by wood and wetlands allowed a different interpretation of the early medieval landscape in northern Italy. These settlements were new elements of the landscape, geographically distant, materially and socially different from the previous late antique centres

[174] On this aspect see Panato, 'Rural monasteries'.
[175] Saggioro, 'Paesaggi': 47-67.
[176] Id., 'Insediameti': 82. On the general archaeological issue for pottery and coins see Chapter 4.1.
[177] See Chapter 1.3.

with an agricultural economy based on the cultivation of different crops mixed with the exploitation of forests and wetland products.

This is particularly evident in the plain north of the Po. According to the principal studies carried out in the area delimited to the west by the river Oglio, to the east by the Adige, to the north by the pre-Alpine line and to the south by the Po, there are two different trends according to the geomorphological features of the territory they occupied: the high plain, closer to the Alpine chain, and the low plain, closer to the Po, an area strongly influenced by hydrological instability.[178] In the pre-Alpine section of the plain early medieval settlements were characterised by continuity in their use from the late Roman period until after the sixth century. On the contrary there is a more complex situation in the low plain, where new patterns developed. In this area, small new settlements developed from the end of the seventh and especially in the eighth and ninth centuries.[179]

Similarly, it is also possible to see a growth of new early medieval settlements in Emilia even if the continuity with previous late Roman settlements is more marked here compared to the northern examples, so that there was a high human population in the countryside throughout the following centuries.[180]

Both north and south of the Po, these new settlements shared a similar position on the river levées or on natural high ground in close proximity to inland waters. Examples are sites in the plain south of Verona like Moratica on the levée of the Tione, or Rovescello, Aspo, Nogara and Gazzo, along the Tartaro. Other examples south of the Po are the sites of San Martino Vecchio in Guastalla (RE), Quingentole (MN), Ghisone of Villa Poma (MN), or Canolo in present day Correggio (RE), all early medieval settlements partially new or founded near pre-existing sites – located on the river levées of the Po and its tributaries.[181]

The proliferation of these settlements on high ground has been mainly interpreted as a natural protection against foods.[182] Limiting the risk of flooding, however, seems to me the most simplistic explanation for this phenomenon. In fact, it was not the only reason behind the

[178] See Chapter 1.1. for the geomorphological division of the plain. The principal overviews on the territories of the cities of Brescia, Mantua and Verona are: Mancassola – Saggioro, 'Insediamento': 307-330; Saggioro, 'Insediameti': 81-104; Id., 'Ricognizioni, paesaggi ed esperienze di ricerca nei territori di pianura tra Veneto e Lombardia', in Mancassola – Saggioro (eds.), *Medioevo*: 65-86.
[179] Saggioro, 'Insediameti': 90.
[180] C. Negrelli, 'Le strutture del popolamento rurale tra IV e IX secolo in Emilia-Romagna e nelle Venezie', *AnTard* 21 (2013): 77-92.
[181] *Ibid*.: 120. F. Saggioro – N. Mancassola, 'Paesaggi medievali di pianura: considerazioni e risultati preliminari sul progetto Ghisione-Villa Poma (MN)', *Quaderni di Archeologia del Mantovano* 6 (2004): 75-84. Mancassola, 'Uomini e acque': 121. A. Chavarría Arnau – A. Crosato, 'La cristianizzazione del territorio mantovano tra Tardoantico ed Altomedioevo', in C. Ambrosini – P.M. De Marchi (eds.), *Uomini e acque a San Benedetto Po. Il governo del territorio tra passato e futuro* (Florence 2010): 37-41. M. Ficara, 'L'occupazione dei dossi fluviali nel territorio di Reggio Emilia: il caso di Canolo di Mezzo', in Mancassola – Saggioro (eds.), *Medioevo*: 147-168.
[182] Mancassola, 'Uomini e acque': 119.

formation of these settlements. As is evident in the case of Ferrara, floods were frequent and periodically reached the centre of the settlement, especially in spring. The shift of fireplaces and the seasonal alluvial deposit highlighted at the site of Corso Porta Reno, attest to the constant adaptation of these settlements to an unstable water level. Nevertheless, the settlement was continuously occupied and later developed into the early medieval centre of Ferrara, as previously described.[183] This example implies other factors than just the limitation of flooding risk as the main reason behind the foundation of these new early medieval settlements.

One of the reasons can be seen in the active use of the nearby watercourse for movements and economic purposes. In the plain south of Verona, written sources attest to the high economic value of these areas: for example, in 883 the dispute between Worado, count of Verona, and Leo, abbot of San Zeno of Verona, for the *silva* of Ostiglia (an area that eventually was given to the monastery by Lothar I)[184] shows that this territory was important for both the ecclesiastical and secular authorities. The *silva* was already the focus of a monastery's attention in 820, when the monastery of San Silvestro of Nonantola and Hucpald, count of Verona, contended the ownership of the area, which demonstrates an increase in the economic interest in these *silvae* at the beginning of the ninth century.[185] The urban monastery of San Zeno in Verona also seems to be active in this territory, receiving the donation of a property in the nearby *silva* of Moratica, another area of strong economic value.[186]

Overall, from the ninth century the growth of new settlements near *silvae* and watercourses became a crucial characteristic of these areas of the Po valley. Here the economic exploitation of 'wilderness' and the easy accessibility of important communication routes – like the numerous watercourses and the ancient Roman roads – became the two main factor that allowed the development these new centres, in particular from the ninth century. In particular, the control of the principal communication routes was fundamental for administrating large areas of the landscape. This is evident for sites like Piadena, Nogara or Sant'Agata Bolognese,[187] at which – starting especially from the tenth century but with some earlier examples at Sant'Agata – fortifications developed on the highest points of the landscape and close to river and terrestrial routes. The tenth and eleventh century charters show how these early rural

[183] This has been highlighted in Saggioro, 'Paesaggi in equilibrio': 62. For the sites in Ferrara see Chapter 3.1.3.
[184] CDV I, 140, 143.
[185] E. Rossini, *I livelli di Ostiglia nel secolo IX. Contributi alla storia dell'agricoltura veronese* (Verona 1979).
[186] CDV I, 66, 67. On these issues see Panato, 'Rural monasteries'.
[187] Brogiolo – Mancassola (eds.), 'Scavi al Castello di Piadena': 121-220. F. Saggioro, 'L'area e la sequenza di scavo', in Id. (ed.), *Nogara*: 53-55. S. Gelichi, 'Lo scavo. Localizzazione del sito, tempi e strategie', in Gelichi *et al.* (eds.), *Un villaggio*: 17-25.

settlements along important communication routes became new administrative centres of the territory that were closely linked to the most important local authorities.[188]

Apart from their location on high ground and along major routes, eighth and ninth century new settlements in the low plains of the Po valley shared another interesting feature: their tendency to centralisation. These centres in the Po valley share similar features with the so-called Tuscan model, identified in the late 1990s by the archaeological school of Siena.[189] In the Tuscan examples, starting from the seventh century, after the demise of the aristocratic power in the countryside, the peasants started to construct hilltop-based settlements. These villages became the principal rural productive centres (*curtis*) in the ninth century, before evolving into castles (productive and administrative centres) in the tenth century. The agglomeration on hilltop sites of rural communities seems to be similar to the examples in the Po valley. However, some of the dynamics are quite different: firstly, apart from the obvious difference in the geographic setting, the initial agglomeration in the Po valley happened in remote places, far from the pre-existing centres, while in Tuscany a shift of previous settlement is clearer; secondly, the characteristics of the centralisation process were different.

In the Veronese, for example, surveys have shown the presence of hamlet (*a maglie larghe*) settlements, composed of small centres all coordinated by a central place, often a monastery as in the case of Santa Maria of Gazzo.[190] Similar cases, in fact, seem to be found at Moratica and Bonferraro, in which the separation of settlements from the main central site led the Italian archaeologists to talk about a peculiar model of settlement called '*a nebulosa*' that seems to develop particularly during the eighth and ninth centuries, and was characterised by groupings of single-house or hamlet settlements, quite different from the Tuscan model.[191] Another similar example can be found around Nogara, where the main site is surrounded in the nearby areas by the villa of Tilloano and the *curtes* of Rovescello and Due Roveri.[192]

In the plain between Brescia and Cremona close to the Oglio river, the large number of burial sites and rural churches distributed around major religious centres, also seems to indicate

---

[188] Brogiolo – Mancassola (eds.), 'Scavi al Castello di Piadena': 121-122. A. Castagnetti, 'Le origini di Nogara (906) fra il re Berengario, il diacono veronese Audiberto, il conte Anselmo e il monastero di Nonantola', in Saggioro (ed.), *Nogara*: 1-50. P. Cremonini, 'Storia e storie attraverso le fonti scritte', in Gelichi *et al.* (eds.), *Un villaggio*: 26-87.

[189] For a definition of the model see R. Francovich – R. Hodges, *Villa to village. The transformation of the Roman Countryside in Italy* (London 2003). M. Valenti, *L'insediamento altomedievale nelle campagne toscane, Paesaggi, popolamento e villaggi tra VI e X secolo* (Florence 2004). G.P. Brogiolo – A. Chavarría Arnau, *Aristocrazie e campagne nell'occidente da Costantino a Carlo Magno* (Florence 2005): 112-117.

[190] Saggioro, 'Insediameti': 90-91. For Santa Maria of Gazzo as central place of a 'a maglie larghe' settlement see Id., 'Insediamento e monasteri nella pianura veronese tra VIII e XIII secolo', in R. Francovich – S. Gelichi (eds.), *Monasteri e castelli fra X e XII secolo. Il caso di San Michele alla Verruca e le altre ricerche storico-archeologiche nella Tuscia occidentale* (Florence 2003): 169-182.

[191] Id., 'Insediamenti': 91.

[192] *Ibid*.: 91.

the formation of socio-economic networks that led to nucleated '*a maglie larghe*' settlements.[193] In the area of present day Calvisano, five cemeteries have been studied which have a maximum distance of 5km from the main centre.[194] Close by, excavations at Leno indicate the presence of several burials near early medieval churches that could have played a role of centre of attraction from the first half of the seventh century.[195] Written sources confirm this distribution: In 760 the king Desiderius donated ten *casae massariciae* in proximity of the river Oglio near the present day locality of Piscilesso in Calvatone (CR) to the monastery of San Salvatore of Brescia.[196] In the following year, probably in order to strengthen its possessions on the Oglio, the abbess of San Salvatore of Brescia, Anselperga, also exchanged some properties receiving half of the *curtis* of Alfiano and the *curtis* of Regona, which shows the centrality of this area for the economic management of the monastery.[197] Looking at the map (Fig. 9), the location of these central places seems to develop in strategic areas that allowed a better communication, not only with the nearby settlements, but also along major communication routes both on road and water.

Even if it is possible to see differences in terms of size and administrative importance, settlement patterns in Emilia at the end of the Lombard period were also characterised by a progressive centralisation and were sited along principal communication routes.[198] The plain between Modena and Bologna, crossed by a number of unstable small watercourses, was characterised since prehistory by important settlements along paleochannels. In Roman times, the territory was organised up through centuriation, with small watercourses crossing the plain for irrigation purposes.[199] The several watercourses that crossed the territory allowed mobility and the development of economic networks in the middle ages based on a series of

[193] *Ibid*.: 95-97.

[194] M. De Marchi, 'Calvisano e le necropoli d'ambito longobardo in località Santi di Sopra. La pianura tra Oglio, Mella e Chiese nell'altomedioevo', in L. Paroli (ed.), *L'Italia centro-settentrionale in età longobarda* (Florence 1997): 377-411.

[195] A. Breda, 'Leno. Monastero e territorio. Note archeologiche preliminari', in A. Baronio (ed.), *L'abbazia di San Benedetto di Leno. Mille anni nel cuore della Pianura Padana* (Brescia 2002): 239-254.

[196] «*Verum eciam et conferimus in ipso sancto loco casas masaricias numero decem positis super fluvio Ollio, locus qui Pisserisse nuncupatur, que reguntur per Victorem, Iuvcnculus, Deusdedit, Ursolum, Dominicum, Stephanum, Criseolum, Maurus, Venerandolum et Al[...] vel consortibus eorum, tam casas, terras, vineas, pratas, pascuas, cum uxoribus, familiis, servos pro servis, liberos pro liberis, utriusque sexus et etatis, omnia et in omnibus, cum animalibus, quicquit a suas manus habere comprobantur, habuere masarii terra iuges numero quadringentes. Necnon et cedimus recona, quantum ad curtem nostram pertinet, suptus ipso Pisserisso usque in Ollio in integrum*» CDL III/1,33. See also G. Pasquali, 'La distribuzione geografica delle cappelle e delle aziende rurali descritte nell'inventario altomedievale del monastero di S. Giulia di Brescia', in V. Frati *et al*. (eds.), *San Salvatore di Brescia. Materiali per un museo* I/2 (Brescia 1978): 158; A. Baronio, 'Tra corti e fiume: l'Oglio e le «curtes» del monastero di S. Salvatore di Brescia nei secoli VIII-X', in C. Boroni *et al*. (eds.), *Rive e rivali. Il fiume Oglio e il suo territorio* (Roccafranca 1999): 48–50.

[197] CDL II, 155.

[198] Negrelli, 'Le strutture': 77-92.

[199] Librenti – Cianciosi (eds.), *Nonantola 3*: 9-11.

canalisations, ports and ferries that are listed in the written sources starting from the eleventh century.[200] In this plain, the two centres of Nonantola and Sant'Agata Bolognese became in the early middle ages centres for administration and economic activity, production centres, storehouses for the nearby fields and central places for the population.[201]

Similarities between the early medieval rural settlements near watercourses in the Po valley can also be seen from a more material point of view. Several buildings, in particular wooden houses, found at different sites in Veneto, Lombardy, Emilia and Piedmont, shared similar structures and building techniques, as has recently been demonstrated by Anna Antonini.[202] At Piadena, Nogara, Bovolone, Ferrara, Ghisone (Villa Poma) and Crocetta (Sant'Agata Bolognese), similar buildings were constructed with a technique based on vertical poles with horizontal beams, on a rectangular base of around 5x10 metres.[203] The presence of a shared house design in early medieval northern Italy indicates the circulation of knowledge and the presence of a widespread timber construction culture.[204] This timber construction culture was adapted particularly well to those sites between land and water. In the principal cases of the Po valley, wood was the main material for those structures that attested a direct link between the settlement and the nearby wetland. There were two of these structures in particular and they will be analysed in more detail: the stabilisation of the settled areas, often associated with the creation of a waterfront, and the construction of canals (*fossae*), which met a range of needs and purposes.

[200] *Ibid*.: 10. On the navigation patterns in Emilia see M. Calzolari, 'Navigazione interna': 124-132.
[201] On Nonantola and its production see M. Bergamo *et al*., 'Il monastero e le attività produttive', in Gelichi *et al.* (eds.), *Nonantola 6 – Monaci e contadini. Abati e re. Il monastero di Nonantola attraverso l'archeologia (2002-2009)* (Florence 2018): 137–180. On Sant'Agata: S. Gelichi – M. Librenti, 'Interpretare uno scavo', in Gelichi *et al.* (eds.), *Un villaggio*: 402-404.
[202] A. Antonini, *Architettura in terra e legno in Italia Settentrionale dell'età romana al Medioevo. La trasmissione dei saperi*, PhD Thesis, (Politecnico Milan 2014).
[203] See the Appendix in *Ibid*.: 168-294. Also F. Saggioro, 'Abitati altomedievali in legno nella pianura Veronese: problemi e temi della ricerca', in P. Galetti (ed.), *Edilizia residenziale tra IX e X secolo. Storia e archeologia* (Florence 2010): 75-90.
[204] G. Bianchi, 'Building, inhabiting and «perceiving» private houses in early medieval Italy', *Arqueología de la arquitectura* 9 (2012): 195-212. More recently on the different typologies of houses in perishable materials see V. Fronza, 'Edilizia in materiali deperibili nell'alto medioevo italiano: metodologie e casi di studio per un'agenda della ricerca', *PCA* 1 (2011): 95-138.

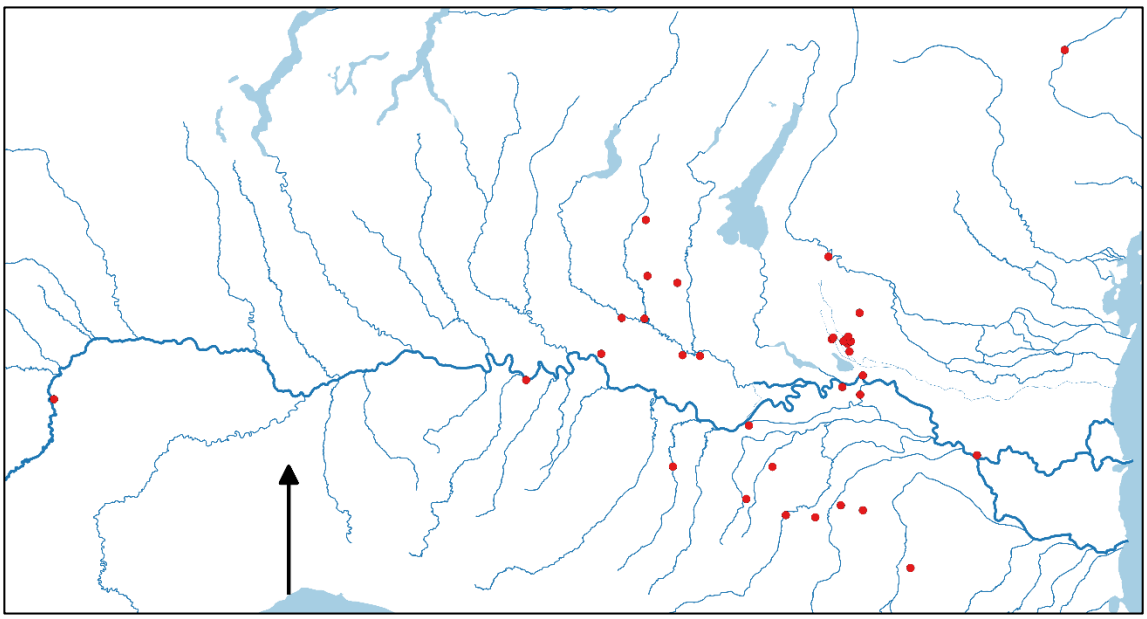


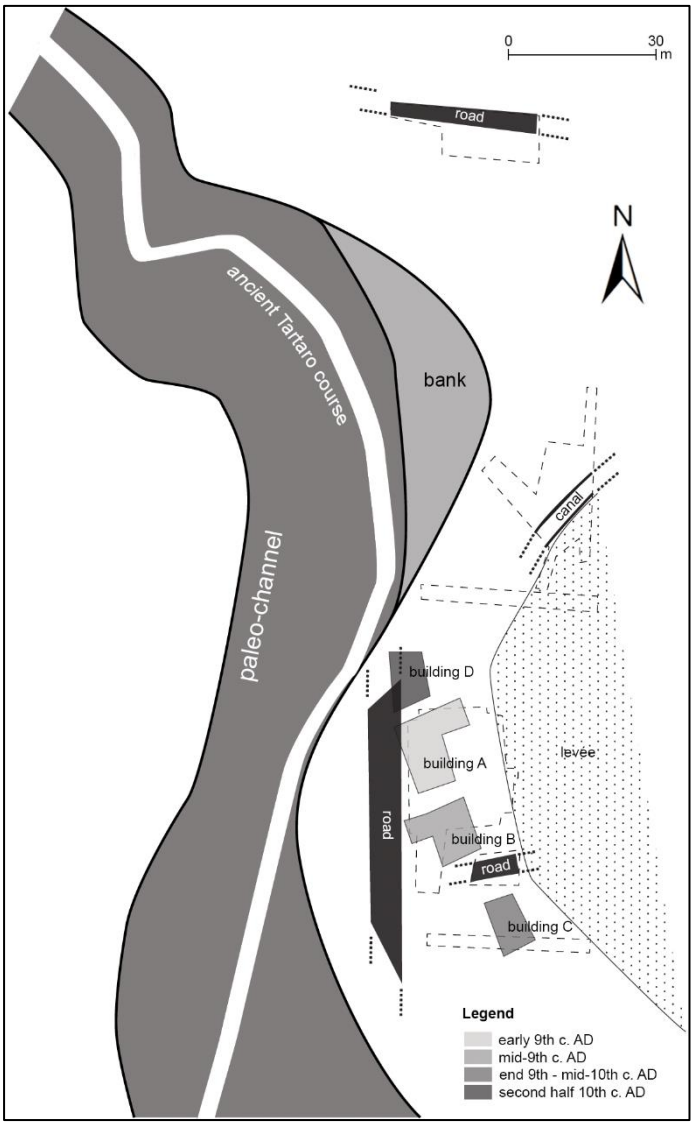
Fig. 9: Places mentioned in the text

3.2.2. Stabilisation of waterfronts in rural areas

The first type of structure that allows us to analyse the link between rural settlements and inland water is directly associated to the first phases of formation of a settlement. Creating a stable surface on which to build houses, warehouses or other structures seems to be a priority for early medieval rural society in wetlands, especially from the end of the eighth century.

The first interesting aspect regarding these stabilisation works is the absence of their mention in the written documentation. In the royal diplomas, the most common terminology used in order to indicate some kind of reclamation activity are the Latin verbs *runcare* or *instaurare* – which are not very common in early medieval documents and do not necessarily have this as their principal meaning – but other stabilisation techniques are not specified.[205] Some information can however be found in the ancient Roman literature. Vitruvius, for example, in the *De Architectura* describes that when constructing docks or port structures, it is important to build fences with tied oak poles that are then filled with lime and stone, creating a base on which the wooden structures would be placed.[206] Similar techniques were also common in

[205] For example, in the MGH the first mention of *runcare* in the Po valley relates to the monastery of San Benedetto Po (MN) in 1096: DD MT, A6. However, *runcora* as a place to be weeded is already mentioned in a Charlemagne's diploma of 781: DD Kar I, 134. On *runcare* and its maening as 'weeding' see D. Moreno, *Dal documento alla terra, Storia e archeologia dei sistemi agro-silvo-pastorali* (Bologna 1990).
[206] Vitruvius, *De Architectura*, V, 12. See also Saggioro, 'Nogara': 328.



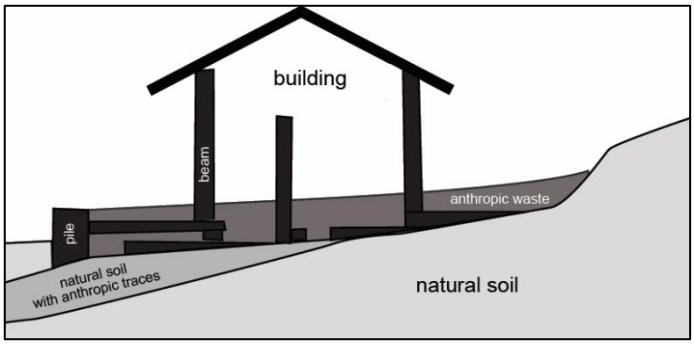


Fig. 10: Nogara, sites and reconstruction of stabilisation work. After Panato, 'Rural monasteries'.

wetland and waterfront areas in the early middle ages. In fact, at Novgorod, Vagen and Bergen,[207] building work was preceded by stabilisation of the terrain. These procedures had been used in the Po valley since the Bronze – especially in the *Terramare* sites – and Iron ages, and in the Roman period.[208] Therefore, with adaptations, it is likely that these techniques were also used during the following centuries.

In northern Italy the first signs of these structures have been recognised in coastal areas, especially in Comacchio and in the Venetian Lagoon.[209] Inland settlements have been uncovered only in recent archaeological excavations and there are not many examples north and south of the Po.

One of the sites at which these structures are particularly evident is Nogara, located on the eastern banks of the Tartaro river in the low plain south of Verona. Its territory has been subject of several archaeological studies since 2003, using different

[207] G.M. Varanini – F. Saggioro, 'Ricerche sul paesaggio e sull'insediamento d'età medievale in area veronese', in S. Lusuardi Siena (ed.), *Dalla curtis alla pieve fra archeologia e storia. Territori a confronto: l'Oltrepò pavese e la pianura veronese* (Modena 2008): 141-145.
[208] Saggioro, 'Nogara': 328.
[209] For Comacchio see Calaon, 'Lo scavo San Francesco': 505-530. For Venice Lagoon see D. Calaon *et al*. (eds.), *Torcello Scavata. Lo scavo 2012-2013* (Venezia 2013).

methodologies: aerial photography, surveys, and excavations. The area occupied by the settlement was quite large and in the tenth/eleventh century covered almost 6 hectares. Nogara is first mentioned in the charters in 906 as a *castrum*, but dendrochronological analysis has shown that the first phases of the fortification were in the first half of the ninth century which means that the settlement was founded earlier than the documents suggest.[210]

The site is divided into three main areas (Fig. 10): the area of Mulino di Sotto, south of the main centre of the settlement, which was characterised by the presence of wooden structures of the late medieval period; the centre of the early medieval settlement (ninth/tenth century), in which there is a strong prevalence of early medieval and high medieval structures with several wooden structures emerging from the canal; and the castle area, settled south-east of the centre on a hilltop, including the little church of San Silvestro that originally faced the river course.[211]

The excavations of the early medieval settlement mainly concentrated on four wooden buildings, though the preliminary investigations do not exclude an earlier occupation of the site. The extension of the built-up area (60 square metres) suggests an initial occupation by four or five familiar nuclei at the beginning of the ninth century, according to radiocarbon dating.[212] The reason why these families decided to move to the area are difficult to reconstruct as we have no documents that report any details about specific roles of this community in this area. Nevertheless, socio-economic interests in the exploitation of these wood and wetlands highlighted by the disputes for the nearby *silva* in Ostiglia – mentioned above – could be linked to the formation of the new community in Nogara.

What emerges from the archaeological excavations is that before constructing the buildings, it was necessary to stabilise the area close to the Tartaro paleochannel in order to allow the new small community to settle close to the wetland.[213] Besides the buildings, in fact, the structures that were found in the 2007 excavations were mainly wooden structures for banks, piles and also a road (probably a footpath used for facilitating movements and activities within the settlement), canalisation and regulation of the watercourses and some remains of a ditch. The site was originally settled in a marshy area close to the river, that was drained probably by compacting the vegetation of the banks or simply by piling up some of the river

[210] On origins of Nogara from the documentary point of view see Castagnetti, 'Le origini': 1-50. For the dendrochronological analysis see O. Tinazzi – E. Lerco, 'Indagine xilotomica e dendrologica su elementi lignei provenienti dallo scavo «Mulino di Sotto» di Nogara (VR): approccio metodologico e relazione preliminare', in Saggioro (ed.), *Nogara*: 77-87.
[211] Saggioro, 'L'area': 53-55.
[212] *Ibid*.: 53-55.
[213] Saggioro, 'Nogara': 327.

shore trees and other waste materials, as recorded, on which horizontal beams were positioned forming row platforms on which the houses were built.

A similar stabilisation of a humid area can be seen – with some differences – in the Emilia plain, south of the Po, at the site of Crocetta (Sant'Agata Bolognese, BO). Archaeological excavations have been carried out between 1994 and 1997 in the area of the supposed site of the eleventh century *castrum Pontelongo*, bringing to light well-preserved medieval structures

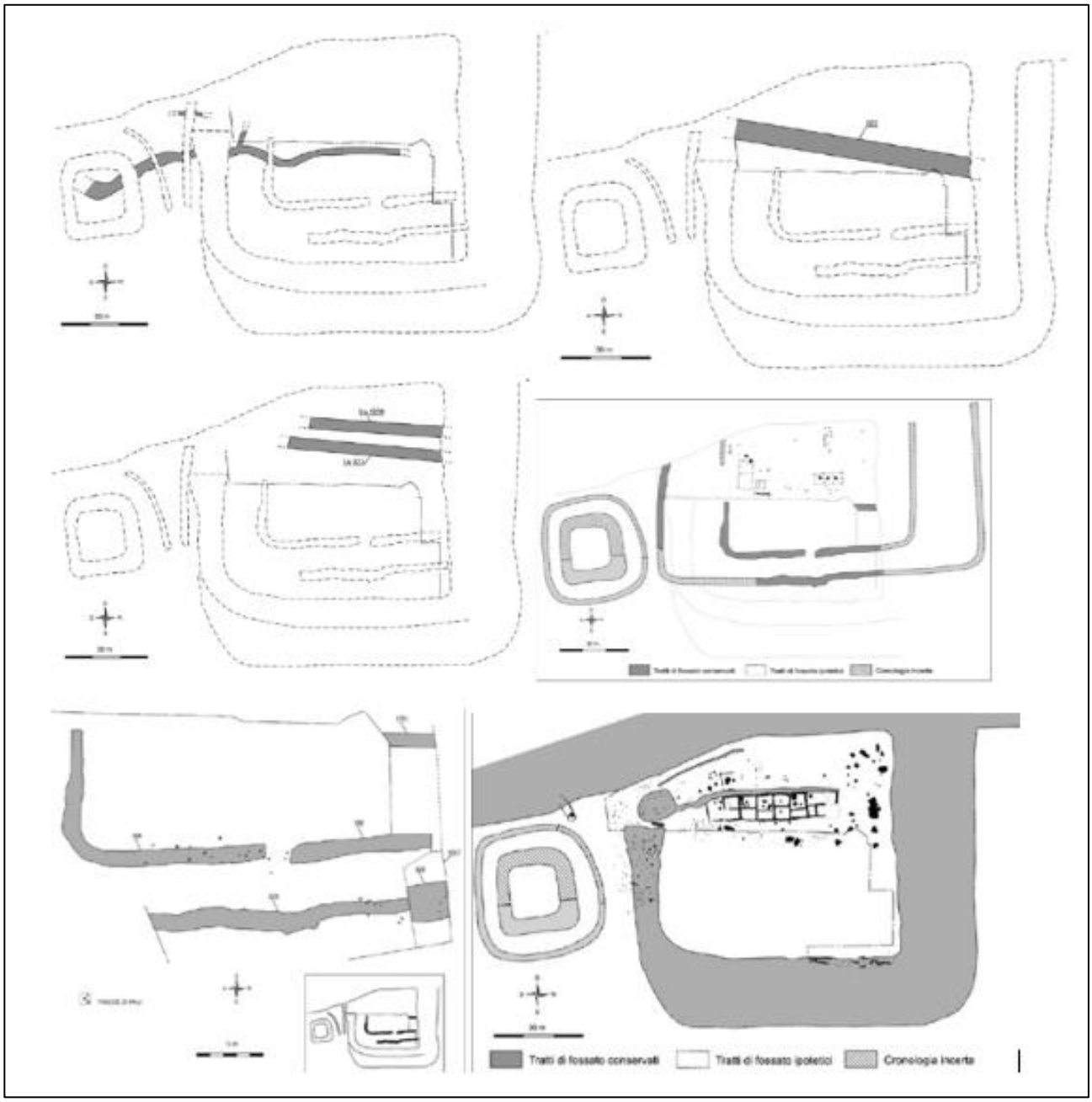


Fig. 11: Loc. Crocetta (Sant'Agata Bolognese, BO), evolution of the site, its ditches and canals between pre-Roman period and tenth century AD. After Librenti – Pancaldi, 'Lo scavo': 88-89.

dating to different periods.[214] The settlement of Crocetta was identified with the medieval *castrum* of the documents because the excavations found a motte-type structure south of the settlement centre dating to the end of the ninth or early-tenth century.[215] The site was settled in an area that had been agricultural land since the Roman period– as is clearly still visible from the centuriation – and the area also had pre-existing irrigation infrastructure.[216] It has therefore been recognised that the early medieval settlement was been located on a pre-existing scheme of ditches and canals, which were already filled with sandy and argillaceous layers in the Roman age (Fig. 11).[217]

The excavations of 1994 also brought to light two ditches surrounding the centre of the settlement, showing a precise plan behind the original early medieval foundation.[218] The quadrangular shape of the diches and their concentric design seem to demarcate different areas of the settlement, perhaps with the support of small fences testified by small post-holes, but because of their size they are unlikely to be defensive.[219] The internal ditch is interrupted for 5 metres in its central section, indicating a possible access between the two areas, supporting the idea that the two ditches were simply for demarcation, or alternatively simple drains serving the as yet unclear production activity of the settlement (gardens? Pottery? Textile working?). The regular shape of these ditches, and the alignment of the internal buildings along the same axes emphasises again that there was an authority that managed the formation of the early medieval settlement and developed an occupation plan from previous land-divisions, exploitation and the water management of the surrounding territory.

From the beginning of the tenth century the surface of the settlement seems to have been stabilised using vegetation and waste materials, while a large canal was constructed surrounding the entire settlement.[220] The presence of a wooden walkway (following one of the previous ditch), the consolidation of the motte in the southern section of the site, and the regularity of the buildings are all elements that support the hypothesis of a preconceived plan for the development of the settlement.[221]

At both Nogara and Sant'Agata, the stabilisation of the ground preceded the foundation and the growth of the settlement, indicating precise planning behind their construction in wetlands. The documentary evidence in this case could partially confirm this trend. If in this

[214] For Sant'Agata Bolognese see the first results in Gelichi–Librenti, 'Un villaggio': 101-117. More recently: Gelichi *et al.* (eds.), *Un villaggio*.
[215] S. Gelichi, 'Lo scavo': 17-25. The motte, in fact, has similar structures to the almost contemporary fortifications at Nogara and Piadena, north of the Po: Gelichi – Librenti, 'Interpretare': 402-404.
[216] M. Librenti – P. Pancaldi, 'Lo scavo. Il villaggio e i fossati', in Gelichi *et al.* (eds.), *Un villaggio*: 88-92.
[217] *Ibid.*: 88-92.
[218] *Ibid*.: 95-97.
[219] Gelichi – Librenti, 'Interpretare': 402-404.
[220] Librenti–Pancaldi, 'Lo scavo': 95-97.
[221] *Ibid*.: 98-125.

latter example at Crocetta, we could identify a pre-existing management of the territory from the Roman period – without any precise references in the charters – we can reconstruct a clearer socio-economic scenario for the tenth-century development of Nogara in the light of its area. In line with the interests that the powerful monasteries of San Silvestro of Nonantola and San Zeno had in the nearby territories, the 'colonisation' of a site like Nogara could be linked to this new socio-economic plan.[222] The tenth-century documents show that Nogara, like the nearby centres of Rovescello and Due Roveri, was linked to the royal and the Veronese ecclesiastical spheres of influence.[223] At the beginning of the tenth century these centres were all located in proximity to the river Tartaro and developed an important strategic role for communications among the fiscal properties, the production and circulation of goods linked to royal business, and control of the area.[224]

The cases of Nogara and Crocetta are the two principal examples of waterfront stabilisation in the Po valley hinterland and reflect a proper organisation and management of wetlands especially between the late Lombard and early Carolingian periods. Research must continue into this type of site which could yield new information on the link between rural society and water in the Po valley. Especially those sites in which some structures have already been identified could extend the range of examples in the whole of northern Italy.

In the north-eastern Veneto, for example, archaeological evidence of a first early medieval stabilisation of waterfront has been found in Cesana di Lentiai (BL).[225] Here, an unclear early medieval stabilisation phase preceded the construction of wall structures (which need to be further understood): the complex was settled close to the Piave river at a point that has been identified as where it was crossed by the Roman *Via Claudia Augusta*. The use of local vegetation as stabilisation material recalls similar structures at Nogara and confirms the planning behind the construction of the structures at an important communication crossing point.

These first attempts to stabilise waterfronts induce us to rethink the role played by water in early medieval societies. As has been seen regarding the typologies of buildings and their techniques, it is evident that during the early medieval period, particularly in the eighth and ninth century, stabilisation structures and wetland reclamation started particularly in the eastern Po valley, sharing similar techniques which have a common original model in the Roman period.

[222] Saggioro, 'Nogara': 338-342.
[223] Castagnetti, 'Le origini': 19-23.
[224] Nogara is mentioned as *castrum* in 906, in DD Ber I, 65. Rovescello is a fiscal port in 910 as in DD Ber I, 72. For Due Roveri see Castagnetti, 'Le origini': 21.
[225] C. Rossignoli *et al*., 'Cesana di Lentiai. Indagini archeologiche preliminari in un sito altomedievale', *NAVe* 2 (2013): 15-21.

In considering these structures, early medieval men and women in the Po valley should perhaps no longer be considered passive victims of natural events. On the contrary, they were agents in the landscape as is also evident in the construction and maintenance of new or pre-existing canals.

3.2.3. Canals and water deviations between written and archaeological evidence

Research on early medieval canals has increased in recent years, promoting interdisciplinary methodologies and on the basis of a number of case studies particularly in central Europe.[226] In northern Italy, research was mainly conducted in coastal and delta areas in the Veneto and Romagna, in which the primary focus was to highlight the importance of these structures as communication routes and to assess how much of the ancient Roman canal system survived and was maintained in the late antiquity and the early middle ages.[227] The outputs of this approach and its interests were, therefore, limited to specific areas and unilateral in defining canals as a survival of the ancient Roman management of the countryside. An overview of the available historical and archaeological evidence for the early medieval canals would suggest new interpretations and uses for these artificial watercourses that highlight, however, different uses and resources of water in rural areas.

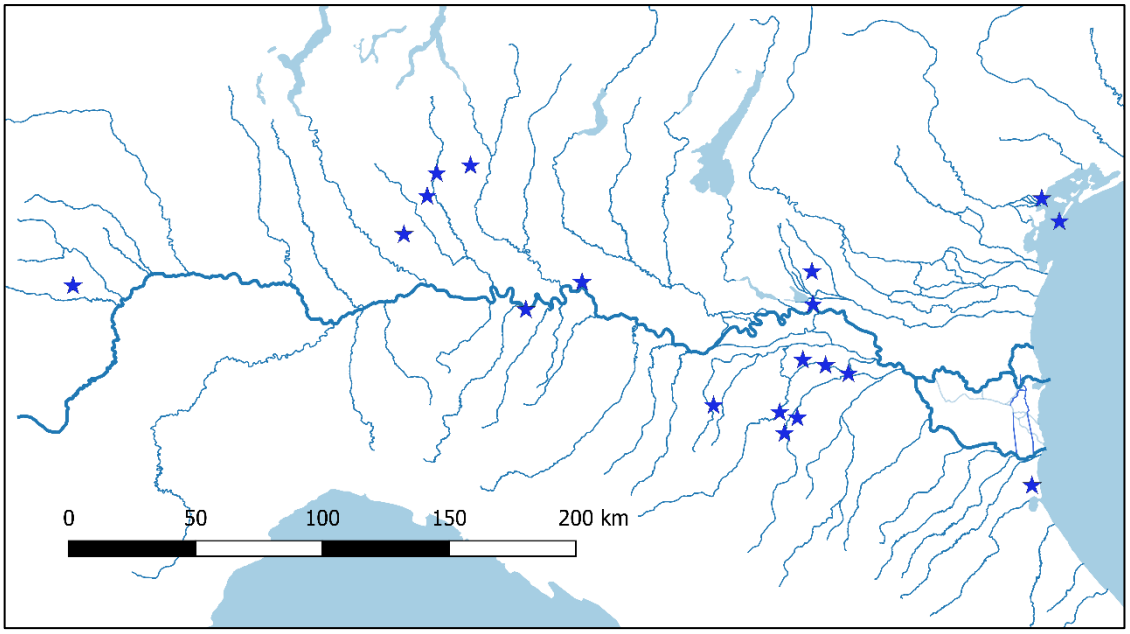


Fig. 12: Location of the *fossae* named in Tab. 3.

[226] See for example C. Zielhofer *et al.*, 'Charlemagne's Summit Canal: An Early Medieval Hydro-Engineering Project for Passing the Central European Watershed', *PLoS ONE* 9/9 (2014): 1-20.
[227] See Chapter 2.1 and 2.2.

Starting from the information available in the charters regarding canals (*fossae*), their construction and management during the eighth and long ninth century, the royal diplomas mention 33 different canals in Italy, and half of them are concentrated in the Po valley, particularly in the present day regions of Emilia-Romagna and the Veneto (Fig. 12). Their location has in general been recognised outside the principal urban centres but some of them were built close to main river cities, possibly with the intention of linking the urban centres with the river networks – as in the cases of Piacenza and Cremona. According to the available documentation, the principal beneficiaries for their control, maintenance and economic exploitation were urban and rural monasteries, like the monastery of San Silvestro of Nonantola (Tab. 3). This monastery, in fact, developed strong control over these watercourses, as the donations in the diplomas of Louis the Pious and his son Lothar attest. Particularly in a diploma issued in 818, Louis granted the abbot of San Silvestro, Peter, the possibility to canalise (*deducere*) the water of the Panaro, the possession of marshes, the *fossa Levatura* and a section of the *Gena* river – between the public road and the *Rosalese* – on which the monastery was allowed to exercise the *ripatico* (rights of mooring, crossing and using the river banks) and install mills along the river banks.[228]

According to the documents, we may assume that the principal activities connected to the creation and maintenance of canals in inland territories – apart from inland navigation that can be considered the traditional explanation for canals –[229] were to bring water to specific areas in order to facilitate agricultural productivity through irrigation or feeding mechanical structures like mills.[230]

In recent years, archaeological research also increased in rural areas, providing examples of early medieval canals and material evidence for them allowing the investigation of the different uses that these artificial watercourses were put to in rural societies. Principal examples of canals have been found in Emilia, particularly at two rural sites.

San Silvestro of Nonantola can again be considered one of the best case studies. At the beginning of the 2000s, archaeological excavations were conducted at different sites in the historical centre of the present-day village of Nonantola (Giardino Perla Verde, Torre dei Modenesi, Torre dei Bolognesi, Piazza Liberazione and the new abbey of San Silvestro), but the most interesting results concerning the link between the monastic community and water in their nearby territory have only been published very recently.[231] In particular the most recent

[228] *Placiti*, 106: 394.
[229] Calzolari, 'Navigazione': 124-132.
[230] In particular concerning the use of canals for mills in the territory of Nonantola see P. Galetti – B. Andreolli (eds.), *Mulini, canali e comunità della pianura bolognese tra Medioevo e Ottocento* (Bologna 2009).
[231] A. Cianciosi *et al*., 'Lo scavo e la sequenza insediativa nel monastero', in Gelichi *et al.* (eds.), *Nonantola 6*: 125-136.

excavations between 2004 and 2009 were focused on the present day courtyard of the abbey, the area in which the early medieval monastery was established. These excavations uncovered an artificial watercourse 5 metres wide and 1.5 metres deep that between the ninth and the tenth century was found to have crossed the site in a north-east/south-west direction, very close to the structures that have been recognised as the abbot's house (Fig. 13).[232] The archaeologists interpret this watercourse as part of the *Torbido* canal that crossed the settlement feeding the numerous ditches linked to artisanal activities, like lead (*Plumbum*) and brick production.[233] The monastery, therefore, developed a direct link with the nearby watercourse that from the monastic centre and its nearby settlement allowed also a direct connection with all the nearby territory.

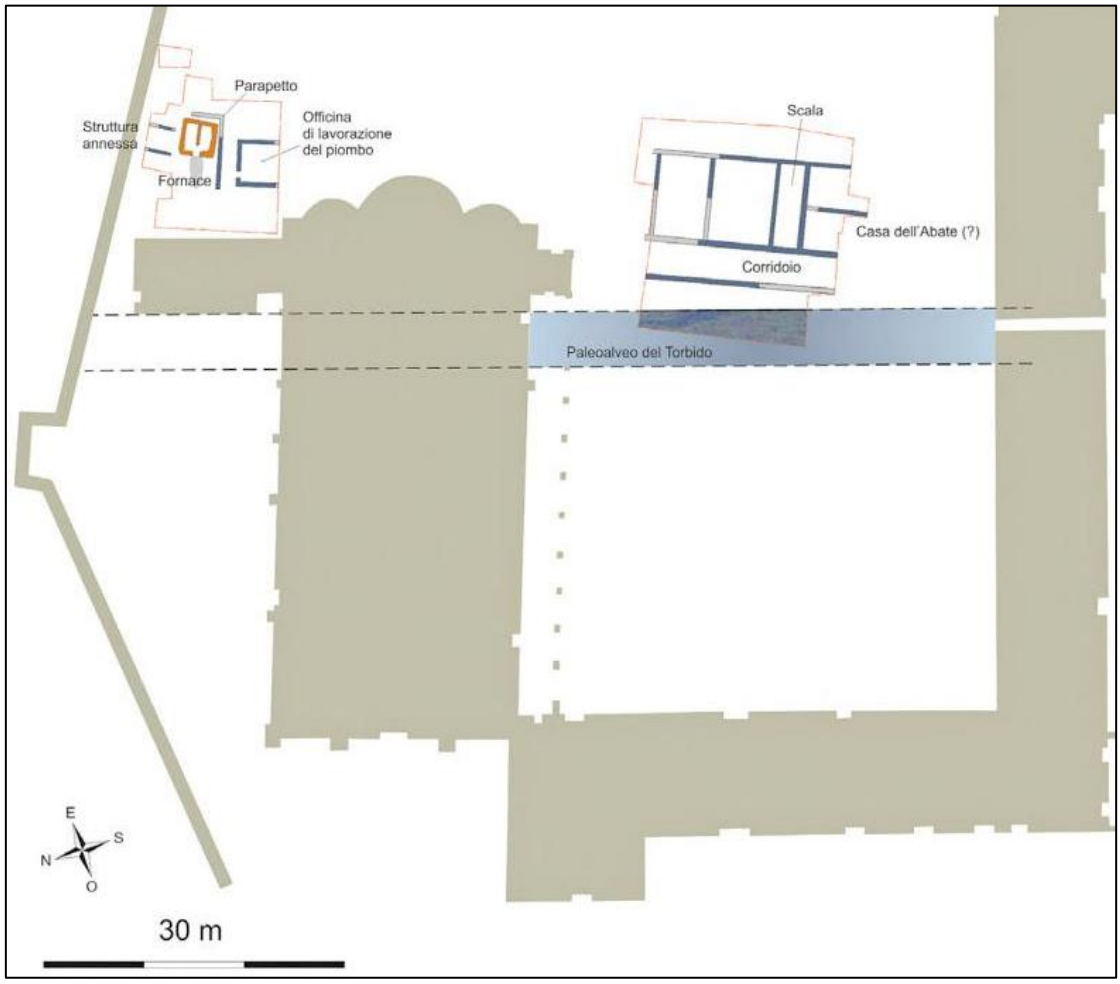


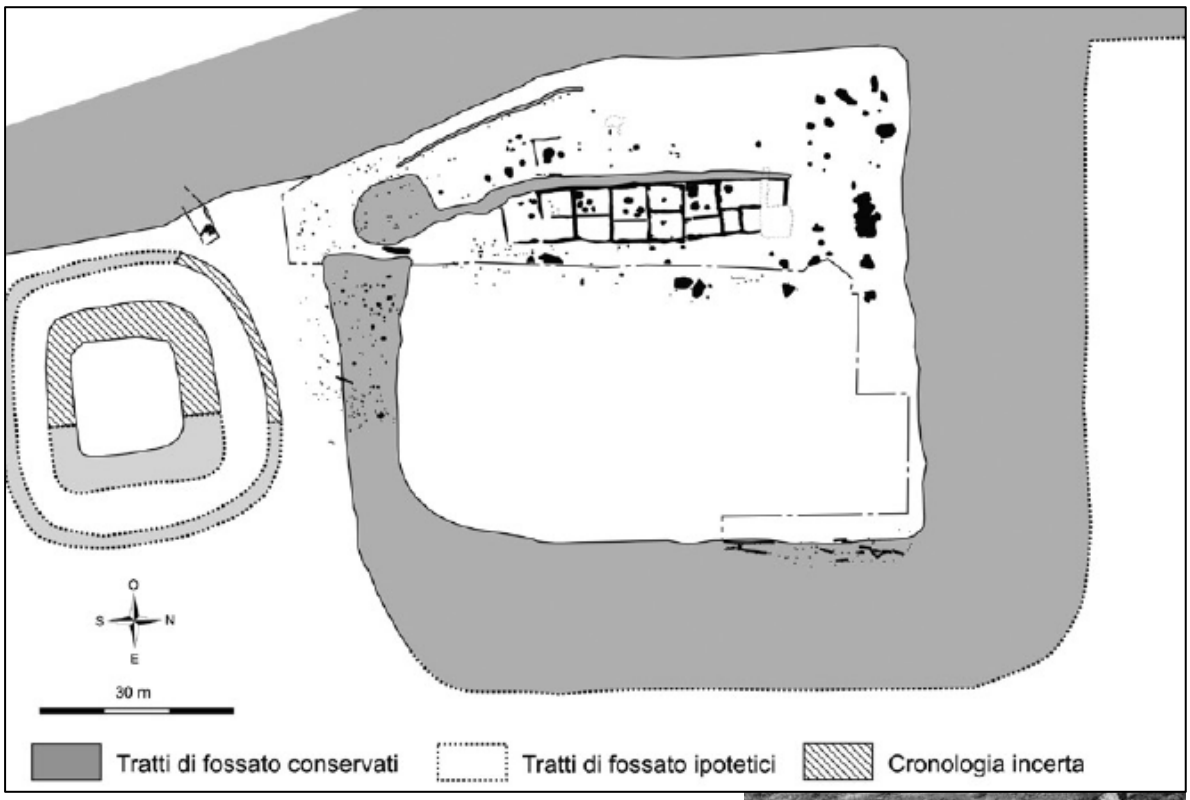
Fig. 13: Nonantola, abbey's courtyard canal reconstruction, in Cianciosi *et al.*, 'Lo scavo': 125-136.

Close to Nonantola, in fact, a second example of an artificial canal has been found at the already mentioned site of Crocetta in Sant'Agata Bolognese. Different sectors of the canal that

[232] *Ibid.*: 125.
[233] *Ibid.*: 125-136. For the different productions in Nonantola see Bergamo *et al.*, 'Il monastero': 137-174.

from the tenth century surrounded the perimeter of the settlement of Crocetta have been excavated. The results showed that in origin – with minor differences in the northern and southern sections – the canal was approximately 10-12 metres wide and 1.70-2 metres deep.[234]

Fig. 14: Loc. Crocetta (Sant'Agata Bolognese, BO), wooden poles and the 10th-century canalisation from Librenti – Pancaldi, 'Lo scavo': 98.



There is anthropic evidence in the canal in particular in its southern and eastern sections. Between the motte and the centre of the settlement, at the bottom of the southern section of the canal, 78 wooden poles with a length of 1.5 metres and a diameter of 30 centimetres have been found set in the ground. On the eastern side, on the other hand, 101 vertical and horizontal wooden poles have been recorded.[235] These poles have been explained as serving to consolidate and support the canal banks. This function is more evident in the eastern section, even if six poles are located closer to the centre of the canal rather than its banks, perhaps indicating the presence of a small mooring point or a simple structure for fishing

[234] *Ibid*., 111–112.

[235] Wood and charcoal studies showed that oak (*Quercus*) was the most commonly used type of wood for making these poles, see M. Librenti – S. Marvelli, 'Paesaggio vegetale e utilizzo delle risorse legnose: il contributo delle analisi xilo-antracologiche', in Gelichi *et al.* (eds.), *Un villaggio*, 324–341.

(Fig. 14). On the other hand, the southern section has much more complex structures that allow to suggest the presence of different features rather than just a stabilisation of the canal banks.

The two examples at Nonantola and Sant'Agata indicate two different types of canals that will have had two – or more – different uses. The different dimensions of the canal, in particular the different structure and width, suggest that it is more likely that the Sant'Agata canal was both for defence and communications. The presence of possible docks in the eastern side situates the settlement in wider networks developed on internal waters and was probably connected to the socio-economic activity of the nearby monastery of San Silvestro of Nonantola.[236] In addition, the presence of several wooden poles in the middle of the canals could be explained as being possibly linked to fishing or fish farming.[237]

At Nonantola, on the other hand, we cannot identify specific structures linked to hypothetical inland navigation, but it has been verified that the presence of water within the settlement was fundamental for the supply of artisanal production.[238] The proximity of important buildings to the canal could, instead, suggest other uses linked to the management and the economy, not only of the settlement – or the abbey itself – but specifically of these buildings. Similar uses, in fact, have already been hypothesised in other monastic centres like San Vincenzo al Volturno – in present-day Campania – where the kitchen was situated next to the Volturno stream for an easy supply of fresh water or for quick disposal of food waste when needed.[239]

The canal found at Nonantola, however, seems to share a range of features with other examples in the Po valley. For example, looking at its dimensions, an interesting comparison can be found with another canal in Emilia, in proximity to Cittanova. During the 1987 excavations at Cittanova, west of Modena,[240] close to the early medieval settlement, a section of a canal 4

[236] Gelichi – Librenti, 'Interpretare', 401–416.

[237] It is difficult to identify specific comparative examples for the fishing structures in particular in continental Europe. The importance of fishing for early medieval societies however and their trade has been subject of several studies in Irish historiography. Similar wooden V-shaped poles have been found in estuarine areas of the Shannon river: A. O'Sullivan, 'Medieval fish traps on the Shannon estuary, Ireland: interpreting people, place and identity in estuarine landscapes', *Journal of Wetland Archaeology* 5 (2005), 65–77. For a general overview and bibliography see M. O'Sullivan – L. Downey, 'Medieval fisheries', *Archaeology Ireland* 23/3 (2009), 30–33, see Chapter 4.2.2.

[238] Bergamo *et al*., 'Il monastero', 137–180.

[239] A. Carannante *et al*., 'Le cucine di San Vincenzo al Volturno. Ricostruzione funzionale in base ai dati topografici, strutturali, bioarcheologici e chimici', in F. De Rubeis – F. Marazzi (eds.), *Monasteri in Europa occidentale (secoli VIII-XI): topografia e strutture* (Rome 2008): 489-507. For San Vincenzo al Volturno's waterfront see F. Marazzi, '*Portus monasterii*. Scali portuali monastici lungo il corso del Volturno (IX-X secolo), *Annuario ASMV* 2 (2014): 201-222; Id., 'San Vincenzo al Volturno tra VIII e IX secolo: il percorso della grande crescita', in Id. (ed.), *San Vincenzo al Volturno. Cultura, istituzioni, economia* (Monte Cassino 1996): 41-92; Id., 'The Early Medieval Alternative. Monasteries as Centres of non City-based Economic Systems in Italy between Eighth and Ninth Century AD', in B. Marin – C. Virlouvet (eds.), *Nourrir les cités de la Mediterranée: Antiquité – Moyen Âge* (Paris 2004): 739-768.

[240] S. Gelichi *et al*., 'Studi e ricerche archeologiche sul sito altomedievale di Cittanova', in A. Cardarelli *et al*. (eds.), *Modena dalle origini all'anno mille. Studi di archeologia e storia* I (Modena 1989): 577-603.

metres wide and 1 metre deep was excavated. This canal seems to have been active until the end of the tenth century while its origin was probably at the end of the Roman period. The reuse of previous late Roman structures for the new early medieval settlement was linked to the hypothetical palace of the bishop of Modena, who moved from the nearby city between the eighth and ninth century.[241] Brick structures and waste materials on the two banks of the canal seem to indicate continuous stabilisation works, and these are also flanked by parallel large holes (4.9x1.2 metres), filled with bricks, gravel and small amounts of early medieval grey pottery (of the same type as found at the bottom of the canal).[242] Initially, Simonetta Minguzzi and Maria Teresa Pelliccioni proposed a drainage/agricultural function for this canal, but its proximity to the bishop's palace and the new settlement may also suggest it was used for other, artisanal, activities linked to pottery or textile production, as proposed both for Nonantola and Crocetta. Alternatively, another simple use of the canal could be as a perimeter ditch for the settlement, as its position alongside the hypothetical medieval settlement and the bishop's palace seems to indicate.[243] The large holes at the edges of the canal may also indicate its use as a waste dump for the nearby settlement, as the case of the early medieval canal in Tortona in Piedmont.[244]

Unfortunately, excavations and fieldwork at Cittanova do not provide further details concerning the structures and functions of the first early medieval settlement. The documents, however, highlights how Cittanova became the real administrative centre of the *comitatus* of Modena,[245] suggesting particular care in the management of the settlement and its canalisation.

Leno (BS), north of the Po and close to the Mella river shows some similarities as it is close to an ecclesiastical administrative centre. Its foundation is certainly the most important in the area and can be easily contextualised in the new monastic foundations policy of the last Lombard kings who supported the creation and growth of important monasteries like San Salvatore in Brescia, San Silvestro of Nonantola, Monteverdi and Monte Amiata in Tuscany.[246] In 758, Desiderius promoted the foundation of the new abbey, which the excavations in the nearby locality of Pluda show was on the site of a pre-existing late Roman settlement, and it consisted

[241] On the bishop of Modena in Cittanova see P. Bonacini, 'Autorità civile e potere episcopale a Cittanova tra l'VIII e il X secolo. Formazione e sviluppo dell'insediamento nell'Alto Medioevo', in Cardarelli *et al*. (eds.), *Modena*: 595-599.
[242] Gelichi *et al*., 'Studi e ricerche': 587.
[243] *Ibid*.: 587.
[244] M. Venturino Gambari *et al*., 'Tortona, via Saccaggi – corso Repubblica. Resti del porto fluviale di età romana e impianti artigianali postmedievali', *QSAP* 26 (2011): 167.
[245] On Cittanova and Modena between the eighth and early tenth century, see Bonacini, 'Autorità civile': 595-599; Id., 'Conti, vescovi, abati. Potere civile e immunità ecclesiastiche nel territorio modenese dell'alto Medioevo', in *Studi Medievali* 37 (1989): 823-837.
[246] C. Azzara, 'Il re e il monastero. Desiderio e la fondazione di Leno', in A. Baronio (ed.), *L'abbazia*: 21-32. M.C. Succurro, *L'abbazia di San Benedetto di Leno (secoli VIII-XV). Istituzione, relazioni, aspetti patrimoniali*, PhD Thesis (Università degli studi di Florence 2012): 72-77.

of wooden huts and a small rural church.[247] Recent excavations conducted by the University of Verona were focused on the eastern area of the present-day Villa Badia – the old location of San Benedetto's abbey - in the small village of Leno. In this area, widespread canalisation seems to start from the seventh century, possibly for irrigation and mobility purposes.[248] During this first phase, the settlement already had two canals, one in the northern area of the excavation and the other in the southern, cutting the area with a north-east/south-west orientation. In the following phase the link with water is more evident with the presence of a third, larger and more evident watercourse with a north-south direction. The orientation of this canal slightly shifted in the eleventh century, but it is not clear if the shift was a result of human intervention or natural phenomena. More detailed publication of the wooden dwellings, the pottery and other material is forthcoming, but for now what can be noted is the important role that water had in these first phases of the monastery, so that we can suggest more complex structures and uses of the canal than just limiting its explanation to defensive purposes.[249]

Fig. 15: Villa Lancia park, Loc. Testona (Moncalieri, TO), mills system excavations, Pantò *et al*.,'Un nucleo': 89-118.

[247] D. Morandi, 'La Chiesa dei Santi Nazzaro e Celso in località Pluda a Leno', *Brixia sacra* 14 (2009): 237-258.

[248] M. Bosco *et al*., 'Note sulla sequenza delle campagne di scavo 2014-2017 presso il sito di S. Benedetto di Leno (BS)', in F. Sogliani *et al*. (eds.), *VIII Congresso nazionale di archeologia medievale* (Florence 2018): 22-25; F. Saggioro *et al*., 'Il Monastero di Leno (Bs): indagini archeologiche (2009-2015) e prime riflessioni sul contesto di scavo', *Temporis signa* 10 (2016): 1-24. Most recently see F. Saggioro *et al*. (eds.), *Il Monastero di San Benedetto di Leno. Archeologia di un paesaggio in età medievale* (Florence 2019).

[249] Saggioro *et al*., 'Il Monastero di Leno': 6-8.

The excavations between 2013 and 2015 in the park of Villa Badia identified a wetland environment in the area north-east of the previous excavations. In this wet area anthropic layers and a variety of structures – wooden poles in particular – have been found, mostly explained as for stabilising the banks.[250] Radiocarbon dating of the wood gives a terminus *ante quem* of the end of the ninth century for the building of these structures. These structures were close to a stone building, parallel to the watercourse, emphasising the idea of direct use of the water and a continuous search for proximity to water by the community throughout the centuries.[251]

The picture that I have described suggests there was of a close relationship between rural centres and artificial watercourses, canals and ditches. Recent excavations in other areas of the Po valley also confirm the development of a daily link between rural settlement and canalised water. At Moncalieri, at the park of Villa Lancia at Testona close to the city of Turin, a complex system of wells based on previous pre-Roman natural ditches was reinforced with stone and bricks, wooden (*Quercus Robur*) banks and small piles, and was probably linked to the original settlement of the eleventh-century *villa* and *burgum* (Fig. 15).[252] The early medieval settlement was probably founded between the sixth and ninth centuries as dated by a series of nearby Lombard burials,[253] but the system of wells, and the maintenance and adaptation of the previous drainage system highlight the conscious strategy and plan of the community to preserve efficiently the link with water, allowing the development and growth of the settlement itself.

Archaeological evidence for canals and ditches in the Po valley suggests a far more complex situation compared to the information available from the documents. The royal diplomas suggest that the main uses for the *fossae*/*fossati* are linked to inland navigation, irrigation and agricultural activities, or as geographical marker for properties.[254] From material evidence, the proximity of these canals seems to imply a series of other parallel uses for a range of activities. Rural communities saw water and its canalisation as an almost indispensable tool, preferring to live close by even in those environments like Leno or Testona where wetlands and flooding events have been archaeologically recorded.

---

[250] *Ibid*.: 10.

[251] *Ibid*.: 13-14.

[252] G. Pantò, 'Moncalieri, fraz. Testona, loc. Castelvecchio. Testimonianze di età altomedievale', *QSAP* 18 (2001): 121-122; G. Pantò – F. Occelli, 'Moncalieri, fraz. Testona, parco di Villa Lancia. Abitato e necropoli di et longobarda', *QSAP* 24 (2009): 229-234. C. La Rocca, 'Lo sviluppo dell'insediamento di Testona tra XI e XIII secolo', *Bollettino del Centro di studi storici, archeologici ed artistici del territorio di Moncalieri* 11 (1981): 5-27.

[253] G. Pantò *et al*., 'Un nucleo di sepolture longobarde a Villa Lancia di Testona', *QSAP* 28 (2013): 89-118.

[254] For this last use see in particular the description of the *fines* of Flexo which were delimited by a series of watercourses in an area between the Bondeno and Po rivers, see *Placiti*, 36: 12. See also P. Bonacini, *Terre d'Emilia: distretti pubblici, comunità locali e poteri signorili nell'esperienza di una regione italiana (secoli VIII - XII)* (Bologna 2001): 213-233.

3.2.4. Considerations on rivers and their water in rural settlements

In an article in 2012, Fabio Saggioro stressed the importance of micro-historical analyses for the study of wetland settlements and areas.[255] In this chapter, on the other hand, it has been possible to integrate different examples in order to identify a general trend – common to many areas of the Po valley, but with small temporal and geographical differences – that relates to the relationship between human presence and water in the countryside.

In the light of both archaeological and documentary evidence, it is quite clear that the new early medieval rural settlements in the Po valley seem to develop and maintain – from their foundation – strong connections with their water sources and rivers. Unfortunately, single case studies do not find much correspondence between the two different type of sources but, in general, it is possible to recognise in these early medieval rural societies signs of the amphibious culture originally highlighted by Petra van Dam.[256]

The most evident sign could be seen in the causes of the formation of these new settlements in the Po valley wetlands. The traditional explanation is to explain the formation of these rural centres as a consequence of abandonment and mobility due to the hydrological instability and the radical mutation of the environment that obliged communities to settle on high ground, looking for protection from floods and an unstable water regime.[257] The shift of the principal settlement nuclei in the examples of Canolo and Villa Poma could confirm this preliminary explanation. In addition, the position of these new settlements on the river levées seems to highlight the need for protection from water. Nevertheless, in other cases, communities preferred to maintain a closer relationship with the nearby water, constructing canals, ditches and stabilising the nearby wetlands. Although the control of watercourses was difficult and apparently absent in many areas, rural communities settled in wetlands, probably looking for different resources in these environments compared to the previous and following periods, allowing different perceptions and economic uses of water, rivers and wetlands that should not necessarily be read as passive attitudes of contemporary societies to catastrophic natural disasters. On the contrary, we should look to those societies as conscious actors in river and waterscapes, developing a profound and complex relationship with their territory and its waters.

[255] Saggioro, 'Paesaggi': 67.
[256] See the introduction to Chapter, footnote 5.
[257] Mancassola, 'Uomini e acque': 119.

These new settlements in the low plain – as testified by archaeological fieldwork and, partially, also by charters –[258] started after the mid-seventh century. In the first phase of their arrival, the Lombards preferred to settle along the foothills of the mountains following a continuous trend with the pre-existing Roman and late antique sites. The most logical reason for the new seventh-century foundations could be that the shift of the frontier with the Byzantine exarchate created the opportunity to settle new areas close to the Po and its tributaries, which were advantageous communication routes and rich areas in economic terms. The new foundations increased in the eighth century, taking on more defined roles with the last Lombard kind Desiderius, as is shown by the properties of the new monasteries like San Benedetto of Leno, San Silvestro of Nonantola and San Salvatore of Brescia.

As highlighted by Fabio Saggioro in the Veronese case study, this trend of 'colonisation' of the territory close to the Po seems to continue – with the development of the original settlements into much more complex structures like castles – until the twelfth century.[259] The arrival of the Carolingians in the administrative and socio-economic dynamics of the Po valley countryside seems, therefore, not to interfere with this trend. For example, in the case of Nonantola the Carolingian kings, especially in their initial occupation of northern Italy, maintained previous agreements and reinforced monastic institutions and their power in the countryside, promoting the construction of new centres in "peripheral" areas – like wetlands – and their administration and control.[260]

In the eighth and the long ninth centuries, recalling Fumagalli's ideas, it is therefore possible to perceive the centrality of wetlands – and woodland – in the socio-economic life of the Po valley, and these areas were much less marginal than expected. This perception can also be physically measured: Fabio Saggioro has calculated that in the Veronese the distance between first/third-century rural settlements and water was around 260 metres, while during the early middle ages it seems to reduce, reaching 110 metres.[261] The new settlements were established closer to water compared to the period before, indicating perhaps stronger connections to and exploitation of wetlands.

In conclusion, it is possible to affirm that hydrological instability and the wide presence of swamps and marshes from the sixth century led in the past to the perception that in northern

[258] In particular on the foundation of rural churches see C. Azzara, 'Chiese e istituzioni rurali nelle fonti scritte di VII e VIII secolo: problemi storici e prospettiva di ricerca', in Brogiolo (ed.), *Le chiese rurali*: 9-16.
[259] Particularly for a comparison between archaeological and documentary sources on this topic see Saggioro–Varanini, 'Ricerche sul paesaggio': 101-160; A. Brugnoli *et al*., '"Villaggi" e strutture dell'insediamento in territorio veronese tra IX e XII secolo', in P. Galetti (ed.), *Villaggi, comunità, paesaggi medievali* (Spoleto 2011): 361-394.
[260] For the Carolingian influence on San Silvestro of Nonantola see E. Manarini, 'Politiche regie e attivismo aristocratico nell'Emilia carolingia. Il monastero di S. Silvestro di Nonantola', *Annali dell'Istituto Italiano per gli Studi Storici* 30 (2017): 7-74.
[261] Saggioro, 'Paesaggi': 49, in particular *fig*. 2.

Italy the river was an element that negatively conditioned settlement patterns, especially in rural areas. However, according to the material evidence this environment did not impede the formation of rural centres, especially starting from the eighth century, leading us to rethink the relationship between rural society and water and to re-evaluate the idea of the risk caused by water to the formation of new early medieval rural settlements.

These hybrid areas between land and water were characterised by dynamic new trends in which the relationship between humans and rivers seems already to be evident in the distribution of the new settlements. In the Carolingian period from the ninth century, the previous balances seem to be maintained, promoting the development of such a relationship, in which the control and the administration of these areas played a crucial role, allowing the creation of strategic, economic and political networks between different agents. The maintenance of a direct control of rivers and internal waters seems to be a crucial feature in the socio-economic patterns of the Po valley between the eighth and early tenth centuries.

3.3. River cities, countryside and riverscape: some considerations

In this chapter the relationship between urban and rural settlements with the river in the Po valley has been discussed. In this conclusive paragraph I want to highlight the outcomes of the relationship that both these types of settlements developed with the river and its environment.

The proximity to the river represented a rich opportunity for the people leading to the proliferation and the rapid growth of those settlement that shared the patterns of the amphibious culture. The example more evident and explored in the chapter is Ferrara but similar trends and growth have been recognised also in the other cases mentioned in the text.

The development of amphibious dynamics by these urban and rural settlements seems led more by conscious socio-economic (and political) decisions rather than a merely survival need. If watercourse and roads were the skeleton of the riverscape river cities and rural centres were the joints that allowed the mobility of people and goods and the consequent development of socio-economic networks. People were conscious of the opportunity promoted by the river and the foundation of settlements in its proximity represents a direct consequence of this.

This process is perhaps more evident in urban contexts, like in the cases of Pavia, Piacenza and Ferrara at the end of the period considered in this thesis. These river cities, like Cremona and Verona, took advantage of their privileged position allowing a rapid growth during the ninth century becoming at the beginning of the tenth century centres of equal – if not of more – importance as other cities like Brescia, Bergamo and even Milan or Ravenna that, instead, from the eighth century slowly started to lose its centrality in the circuits of exchange

linked to the Po valley.[262] Parallelly, also the rapid rise and growth of centres like Nogara, Sant'Agata and Nonantola culminating in the fortification of these sites can be linked to the proximity to water and the will by local elites of control of the traffic of men and goods circulating along and on internal watercourses.

The riverscape represented, therefore, the stage on which several early medieval socio-economic and political patterns intertwine, mixing together local and wider interests. The analysis of these networks is at this point much needed, in order to complete the picture.

[262] On Ravenna see Cirelli, *Ravenna*: 141-166. Recent archaeological studies, however, suggest a more positive trend on the socio-economic role of Ravenna especially until the tenth century even if a passage from a centre of distribution to a centre of consumption seems to be in act, see C. Guarnieri *et al*., 'Ravenna, una città in declino? Contesti altomedievali di ambito urbano', in Gelichi – Negrelli (eds.), *Adriatico altomedievale*: 115-158.

4. Lords of the river: socio-economic networks between eighth and early tenth-century northern Italy and the Po valley

In this final chapter on the socio-economic networks which developed along the eighth- and early tenth-century banks and waters of the Po, I analyse the actual economic value of the river for Lombard and Carolingian societies. This issue can be summarised as all those economic activities that had at their centre the river, its water and environment. Through the observation of these patterns it will be possible to fully understand the interplay between environment and human activity that has been analysed in its frames throughout the thesis. In fact, the analysis of the socio-economic networks and activities linked to the river represents the final fundamental tile in order to complete the analysis of the early medieval Po valley riverscape, making clear how the opportunity represented by the river, its environment and territory was actually exploited by the society of that time, allowing to understand why those itineraries and settlement patterns analysed in the previous chapters developed along the Po and its tributaries in this specific timeframe.

The analysis of early medieval socio-economic networks in northern Italy has been at the centre of past and present archaeological and historical debate since the formulation of the thesis of Henri Pirenne in the 1920s, according to which the economic scenario south of the Alps was marginal compared to the North Sea revival of trade, limiting interest to the rise of Venice in the second half of the ninth century.[1] Nevertheless in the same years, in Italy several studies were published in local journals concerning the navigation patterns on internal water and the economic impact that this had on the cities of the Po valley.[2] The overview provided by the Italian scholars of the time was in contrast to that presented by the colleagues north of the Alps,

[1] Pirenne, 'Mahomet et Charlemagne': 77-86; Id., *Mahomet et Charlemagne*. It could be possible that Pirenne did not read many Italian studies, considering that in his work he rarely cites Italian scholars, basing the majority of his discussion on Italy on the research of Karl Hartmann Necker.

[2] The first studies were focused on the cities of the Po valley and their link with the river with the main interest in the examples of Lombardy, Emilia and Veneto, linked to the navigation and its economic and juridical benefits: G. Biscaro, 'Gli antichi navigli milanesi', *Archivio Storico Lombardo* 10/20 (1908): 285-324; Solmi, 'Le diete': 18-45; G. Romano, 'Pavia nella storia della navigazione fluviale', *Bollettino della Società Pavese di Storia Patria* 11 (1911): 311-328; A. Solmi, 'L'antico porto di Milano', *Archivio Storico Lombardo* 54 (1927): 457-474; G. Baroni, 'L 'Adda e il traffico del sale', *Archivio Storico di Lodi* 48 (1929): 153-164; Zimolo, 'Piacenza': 168-195; Id., 'Cremona nella stona della navigazione interna', *Atti Congresso Storico Lombardo* 3 (1938): 221-266; Id., 'Pavia nella stona della navigazione interna', *Atti Congresso Storico Lombardo* 4 (1940): 493-534. See also Chapter 2.2. on these themes.

providing – already at that time – evidence of a dynamic economic environment in northern Italy along the Po and its tributaries.

In the following decades, interest in the economic network which developed along the Po generated a historiographical current, still active, that had as a first landmark the previously discussed 1953 book by Cinzio Violante, *La società milanese*. A principal merit of Violante's work was, after the 680 treaty between Lombards and Byzantines, to recognise the growth of new economic trends in northern Italy, basing their subsistence in the urban centres located along the main rivers – the river-cities which we discussed above – and in their markets. Therefore, for Violante the Po river was not only regarded as primary resource of these cities, but also as the natural accelerator of circuits of exchange, favouring revival (*ripresa*) and new developments especially in long-distance trade.[3] The Capitulary of Liutprand is used by Violante – as by his predecessors and successors – as the demonstration of this revival at the beginning of the eighth century, indicating the cities of Comacchio, Mantua, Parma, and Piacenza as the first places of exchange, through the vector of the merchants of Comacchio, and from there in the other centres including Treviso, Verona, Milan, Pavia or Bologna, Modena and Reggio. Pavia with its market is described in the scheme of Violante as the centre of this network in which products from the Mediterranean and the Adriatic coast were brought by merchants from the delta. Every important institution, like bishoprics and monasteries, seems to have had their *cellae* in the capital city in order to benefit from this supposed new golden age of international exchanges and to trade their products from their estates in the countryside.[4]

This system was then coordinated by the king and his agents who, having regulated transports and movements with laws since the Lombard period,[5] confirmed previous and new *pacta* with the people from the Adriatic coast and increased the economic power of their allies – particularly monasteries like San Salvatore/Santa Giulia of Brescia, San Colombano of Bobbio, San Silvestro of Nonantola, San Sisto of Piacenza and other minor (in terms of documentary survival) institutions – through strong donation policies, allowing an articulated distribution of ecclesiastical properties along rivers and roads, in both urban and rural environments.[6] In

[3] Violante, *La società*: 3-50.
[4] Settia, 'Pavia carolingia': 119-123.
[5] On the Capitulary of Liutprand, his system and its later development see Fasoli, 'Navigazione': 564-605 and above Chapter 2.2.; for a different perspective, see R. Balzaretti, 'Cities, Emporia and Monasteries: Local Economies in the Po valley, c. AD 700-875', in N. Christie – S.T. Loseby (eds.), *Towns in Transition: Urban Evolution in Late Antiquity and the Early Middle Ages* (Aldershot 1996), 213-234
[6] For a list of the beneficed ecclesiastical institutions at the time of Charlemagne see K. Schmid, 'Zur Ablösung der Langobardensherschaft durch die Franken', *Quellen u. Forsch*. 52 (1972): 1-36. For Lombard and Carolingian monastic policy see V. Loré, 'Monasteri, re e duchi. Modelli di relazione fra VIII e X secolo', *Settimane* 64 (2017): 947-985. On the role of the queens in these policies see T. Lazzari, 'La tutela del patrimonio fiscale: pratiche di salvaguardia del pubblico e autorità regia nel regno longobardo del secolo VIII', RM 18/1 (2017): 1-23, Id. (ed.), *Il patrimonio delle regine*.

Violante's description of early medieval society – using the (very probably exceptional) case study of Milan – the revival of international exchange passing through the Po, the Adriatic and reaching the Byzantine and the Arab Mediterranean, allowed the formation of new 'social classes' like merchants, coiners and artisans, which in turn contributed to a general socio-economic renewal in particular in the ninth and tenth centuries, in the Carolingian and post Carolingian periods.[7]

Violante's ideas fomented historical and archaeological debate in the following years, being considered by many as the starting point of their discussions.[8] The role of the Po as the engine of long-distance trade was later reprised by Gina Fasoli who, however, expressed some doubts about the size of these circuits, pointing out the overall lack of documentation for such a huge network, especially in the archaeological materials, as evidenced in Chapter 2.2 above.[9] However, the excavations in the delta and lagoon areas, since the first studies in the 1960s,[10] and subsequent analyses especially of ceramic evidence, brought many archaeologists, in the 1990s and 2000s, to strongly support the widespread presence of an international trade with a crucial point of interaction in the coastal sites of Comacchio and the Venetian Lagoon, a fundamental step linking the principal centres of the Po valley with the Mediterranean. First Italian promotor of this picture was Sauro Gelichi along with the archaeological school of Venice, supported, also, by an international community of archaeologists – especially from Anglo-Saxon traditions – and in particular by long-distance trade models set out by Richard Hodges and Michael McCormick.[11] According to these interpretations and the description of Comacchio and

[7] *Ibid*.: 51-87.

[8] In particular on the navigation and the economic impact of Po valley waterways in the years after Violante's publication, see G.C. Zimolo., 'Canali e navigazione interna delle origini al 1500', in *Storia di Milano VIII* (Milan 1957): 865-895; F. Soldi, *La capitale del Po: Cremona* (Cremona 1957); G.C. Zimolo, 'Canali e navigazione interna tra Lambro e Adda nel territorio lodigiano', *Archivio Storico Lombardo* 85 (1958): 221-232; Bognetti, 'La navigazione padana': 5-16. A.G. Bergamaschi, 'Attività commerciali e privilegi fluviali padani del Monastero di S. Colombano di Bobbio', *Archivio Storico Lombardo* 89 (1962): 48-61; G.C. Zimolo, *La navigazione nel Comasco dalle origini ai giorni nostri* (Milan 1962); Id., 'Bergamo e Brescia nella storia della navigazione interna', *Archivio Storico Lombardo* 91 (1964): 362-394; Racine, 'Il Po e Piacenza': 26-37.

[9] Fasoli, 'Navigazione': 564-605.

[10] First important contributions were in N. Alfieri, 'La chiesa in S. Maria in Padovetere nella zona archeologica di Spina', *Felix Ravenna III* 43 (1966): 5-51, for Comacchio area. For a bibliographical overview on the following contributions in Comacchio see 'Scavi e interventi archeologici a Comacchio con fasi di età altomedievale', in Berti *et al*. (eds.), *Genti nel delta*: 485-488. For the Venetian Lagoon firs excavations in the 1960s were in Torcello [L. Leiciejewicz *et al*., *Torcello. Scavi 1961-62* (Rome 1977)] followed by the studies of Ernesto Canal summarised in E. Canal, 'La Venezia sommersa: quarant'anni di archeologia lagunare', in *La laguna di Venezia* (Verona 1995): 193-225; for a more detailed bibliography see S. Gelichi, 'Venezia tra archeologia e storia: la costruzione di un'identità urbana', in A. Augenti (ed.), *Le città italiane tra la tarda antichità e l'alto Medioevo* (Florence 2006): 151-183.

[11] For Gelichi, see the overviews and bibliography of previous works in Gelichi, 'Flourishing places': 77-104, Id., 'The Rise of an Early Medieval Emporium and the Economy of Italy in the late Longobard Age', *Annals for Istrian and Mediterranean Studies* 18 (2008): 319-336. Hodges previously proposed for the North Sea similar circuits of exchange that could find some similarities with the north Adriatic coast case, see R. Hodges, *Dark Age Economics: Origins of Towns and Trade, AD 600-1000* (London 1982). In

Venice as north Adriatic *emporia* – comparable to sites like Dorestad, Quentovic or Ribe in the North Sea area – the Po was considered in the eighth and ninth centuries as the principal natural connector for long distance and interregional trade and economic networks, replacing the previous preferred route of Marseille, Arles and the Rhône valley.[12]

Nevertheless, the idea of a renewed trade since the eighth century and a more detailed organisation during the Carolingian and especially post-Carolingian phase, formulated since Violante's publication and enriched in the following decades, is to a degree in conflict with the relative lack of sources testifying such a large network, meaning that in some cases this opinion can be considered too optimistic. A crucial element is the serious lack of numismatic evidence for the Po valley in the period under consideration. Alessia Rovelli has often stressed the absence of Carolingian silver in the archaeological panorama as a symptom of a strong contraction of the trade network.[13] Even if Rovelli provides a very pessimistic view – perhaps too extreme especially if compared to the other sources reporting a constant circulation of people and goods within the Po valley in the eighth and ninth centuries – the lack of a monetary base complicates the analysis of these circuits. Considering instead the availability of Lombard and post-Carolingian coins, a larger monetary circulation could be proposed. The presence of Byzantine and Lombard coins in the Adriatic and their circulation along the coast, in fact, seems to indicate the maintenance of monetary trade also in the eighth and ninth centuries, including the coastal sites in a wider Mediterranean prospective.[14] The few Carolingian finds (see Tab. 4) in the northern Italian hinterland, however, seem to suggest a different economic trend in the Po valley. There are two causes of this lack of Carolingian silver which Rovelli has recognised: the difficulty of the new kings in reaching a complete control of north Italian mints and – especially – the prevalence between the eighth and ninth centuries of small and regional circuits of exchange that would not require the use of coins.[15]

The ambiguity of material evidence in the Po valley and the lack of written databases for several localities and territories (like Piedmont, eastern Veneto and Friuli) induced other

McCormick, *Origins*, instead the role of Venice is stressed as the principal centre coordinating import and export of several products to and from the Mediterranean.

[12] On this change from the Rhône to the Po valley see Introduction, footnote 18. On the association of Venice and Comacchio with North Sea emporia see R. Hodges, 'Adriatic Sea trade in a European perspective', in S. Gelichi – R. Hodges (eds.), *From one sea to another. Trade places in the European and Mediterranean Early Middle ages* (Turnhout 2012): 207-234, M. McCormick, 'Comparing and connecting: Comacchio and the early medieval trading towns', in Gelichi – Hodges (eds.), *From one sea*: 477-502, Gelichi, 'Flourishing places': 77-104.

[13] A. Rovelli, 'Some Considerations on the Coinage of Lombard and Carolingian Italy', in Hansen – Wickham (eds.), *The Long Eighth Century*: 195-224, Id., 'Coins and trade in early medieval Italy', *EME* 17/1 (2009): 45-76.

[14] Id., 'Gold, silver, and bronze: an analysis of monetary circulation', in Gelichi – Hodges (eds.), *From one sea*, 267-296.

[15] *Ibid*.: 290-291; Id., 'Coins and trade': 75-76.

scholars to more cautious approaches in defining the economic network developed on and around rivers. One of the most important authors following this trend is Chris Wickham who, in summarising the economic network of the eighth and ninth centuries in northern Italy, distances himself from identifying long-distance trade as the principal motor of the economy. Wickham stresses, instead, the importance of a 'substantivist position' in explaining the economic patterns of early medieval Europe. According to this principle different forms of exchange and economy are recognisable and should be analysed following different rules, avoiding generalisation and the formation of structural models.[16] This led to the recognition of different networks according to the goods demanded and people's needs – from luxury goods to oil, wine, salt, and more general common tools and resources, like wood, fur and clothing – and not necessarily attributable to the codified *sistema curtense*, based on the bipartite estates, which represented only one of the possible economic networks.[17]

Considering this diversification of economic circuits, Wickham draws attention specifically to the local scale, leaving aside – but not rejecting – the discussion of long-distance luxury trade encouraged by archaeologists, and focusing more on the regional and local networks of bulk goods and products, which ought to have been the most common form of trade in the Italian peninsula and in the Mediterranean, given the affordability of these products by the majority of people. In addition, the re-evaluation of the available ceramic evidence allowed Wickham to recognise some of these circuits for the period after 650, evidencing how northern Italy in general could have been considered one of the best cases for the study of these patterns.[18]

The influence of Wickham's research on local and regional circuits – as well as of his predecessors – became, therefore, a motor for more recent studies concerning early medieval networks in the Po valley. The interaction between archaeology and documents started to be proposed also in function of these local circuits and not only for discussing long distance trade,

[16] C. Wickham, *Framing*: 694-700. On the substantivist position see the discussion in P. Hordern – N. Purcell, *The Corrupting Sea: A Study of Mediterranean History* (London 2000): 606-607.

[17] On the *sistema curtense* see Andreolli – Montanari, *L'azienda curtense*; P. Toubert, 'Il sistema curtense: la produzione e lo scambio interno in Italia nei secoli VIII, IX e X', in R. Romano – U. Tucci (eds.), *Storia d'Italia. Economia naturale, economia monetaria* (Torino 1083): 5-63; G. Pasquali, 'L'azienda curtense e l'economia rurale dei secoli VI-XI', in A. Cortonesi *et al*., (eds.), *Uomini e campagne nell'Italia medievale* (Bari 2002): 3-71. These authors, however, distanced themselves from the late-nineteenth-century definition of pre-modern economic systems as *geschlossene Hauswirtschaft*, a closed and domestic economy [see the historiographical debate in P. Toubert, 'Le strutture produttive nell'alto medioevo: le grandi proprietà e l'economia curtense', in N. Tranfaglia – M. Firpo (eds.), *La Storia I* (Torino 1988): 51-89], recognising instead the socio-economic dynamism initially proposed by Violante as an integral part of the economic life of the monasteries and institutions they analysed.

[18] Wickham, *Framing*: 732. On ceramic see next part of the current chapter.

as early studies by Ross Balzaretti show.[19] This approach has been further developed over the last decade with the publication of important works like Balzaretti's study of Sant'Ambrogio in Milan, Eleonora Destefanis on San Colombano in Bobbio, and Nicola Mancassola on economic networks in Romagna.[20]

The association between long-distance trade models and the presence of local circuits of exchange – mainly recognised around the important monastic and ecclesiastical institutions of the area – and the recognition, after decades of debate and research on these themes, of their simultaneous presence in northern Italy, developing different networks and economic patterns, are now largely accepted, even if the debate on the extent of the respective networks is still active. The centres and the motors of these circuits were many and probably not limited to the great ecclesiastical lords. Many people were involved in the economic lives linked to the river and found in it a great or necessary source of sustenance.

A crucial aspect of the chapter, in fact, is to understand who were those people that benefited economically from the river and how they were linked to rulers. A more comprehensive picture of this scenario will contribute to better understand the role of the Lombard and Carolingian kings in the management of the socio-economic life along the rivers and to identify how much these sovereigns influenced the economic patterns of the river.

In doing so, I looked at the sources available for the period trying to identify both archaeological and documentary evidence linked to the river. After an overview of both the types of sources, I concluded that more interesting information on the exploitation of the river for socio-economic purposes is available from charters. Archaeology, however, can contribute indirectly by trying to see if it is possible to identify specific circuits in the Po valley hinterland possibly linked to the river for their exchanges and isolated case studies, as has already been done in part in Chapter 3.2. Due to the evident lack of monetary circulation, even if some considerations have been by Rovelli as seen above,[21] the main materials to be taken in consideration are ceramics and soapstone. The first section of the chapter is, in fact, focused on this evidence in order to see what kind of circuits of bulk and luxury goods were active along the rivers, and to see if it is possible to recognise specific clusters or regional networks.

A second section, instead, aims to analyse different aspects concerning the ownership and the consequent socio-economic exploitation of the river and internal waters through the study of the documentary evidence available. Considering the period and the area, the

[19] R. Balzaretti, 'The Curtis: archaeology of sites of power', in Francovich – Noyé (eds.), *La storia*: 99-108 for an introductory approach on the combination of archaeology and documents in the study of economic networks in northern Italy, and Id., 'Cities, Emporia': 213-234, for a first attempt.
[20] Balzaretti, *The Lands*; E. Destefanis, *Il monastero di Bobbio in età altomedievale* (Florence 2002); Mancassola, *L'azienda curtense*. All publications based on their previous PhD research.
[21] See footnote 13.

documents analysed can be divided in two types: royal and private charters. If the first type can reasonably include laws and diplomas mostly edited in the *Monumenta Germaniae Historiae*, private charters present a more varied scenario. After a general overview of the most well-known collections of edited sources – as the *Codex Diplomaticus Longobardiae* by Giulio Porro-Lambertenghi, the *Codice Diplomatico Longobardo* by Luigi Schiaparelli and Carl-Richard Brühl, and more local editions of sources including the *Codice Diplomatico Bresciano*, the *Codice Diplomatico Padovano*, *Le carte ravennati* by Ruggero Benericetti, the *Codice diplomatico Istriano*, the charters of single monasteries (in particular Sant'Ambrogio of Milan and San Silvestro of Nonantola edited respectively by Angelo Fumagalli and Girolamo Tiraboschi, San Colombano of Bobbio edited by Carlo Maria Cipolla, San Salvatore/Santa Giulia of Brescia, with the recent online edition for the *Codice Diplomatico della Lombardia Medievale*, and the polyptychs of the ninth and tenth centuries edited by Andrea Castagnetti and Gianfranco Pasquali) and churches (in particular Cremona and Piacenza by Ettore Falconi and Paola Galetti with the recent publication for Piacenza of the charters of the archives of the Cathedral and Sant'Antonino in the collection of *Chartae Latinae Antiquiores*, and Modena again by Tiraboschi) – I focused my attention on two specific aspects regarding the use of inland water that linked local and interregional economies with the socio-political background: watermilling and fishing. These, in fact, are the more direct forms of river exploitation recognisable in the documentation cited above, even if some other considerations would be needed before undertaking the detailed descriptions of single cases.

Overall, the comparison between material and written sources has helped to clarify the role played by the Po and its tributaries as socio-economic sources and resources in the new equilibrium which is argued here to have developed in the last part of the Lombard domination of northern Italy and in the subsequent formation of the Carolingian kingdom in the Italian peninsula.

4.1. Trade and networks in northern Italy: the tales of ceramic and material evidence.

This part of the chapter is focused on ceramic and soapstone evidence in northern Italy during the eighth and long ninth centuries, in order to give an overview of the possible production and distribution patterns linked to local and long-distance socio-economic circuits in the Po valley and how these networks were linked to rivers and watercourses. In fact, considering the serious lack of eighth and ninth-century coins in the whole Italian peninsula – as explained above – and the small amount of research on other materials like glass or wooden artefacts, the study of

ceramics and soapstone can be considered the principal material evidence which can be used to fulfil my research aims.[22]

Before entering in depth into these single analyses, it is important first to examine how the study of these materials developed in the past and what was its impact upon the historiography of this period and geographical area. In general, research and excavations which focused on medieval ceramic evidence began in the 1970s. The initial paths of the research dealt with two aspects: on the one hand the aim was the publication of late antique and early medieval layers at sites like Castelseprio, Ibligo Invillino, Castelgrande di Bellinzona and Torcello; on the other hand, a focus on late medieval rough ceramics, especially those that emerged from the excavation at Rocca di Rivoli, S. Giorgio in Poggiale and Santa Giulia of Brescia.[23]

Almost a decade after these initial specialist pottery reports, the first important contribution to summarise research progress until that point was published by Gianpietro Brogiolo and Sauro Gelichi in 1986.[24] In this article, the two Italian archaeologists focused attention on the transformations of grave goods and ceramic forms throughout the middle ages, providing an initial diachronic perspective. Ten years later in 1996, Brogiolo and Gelichi presented a further synthesis of pottery research, highlighting the fact that until that point scholars and researchers omitted from their studies the evidence concerning the period between the eighth and ninth centuries.[25] They noted that, in this temporal phase in northern Italy, all evidence for fine ceramics disappeared and the kitchen inventory forms were drastically reduced to more simple materials like common grey clay and soapstone. In setting out these research issues, Brogiolo and Gelichi also proposed what the next steps of research should be developed, giving considerable importance to the study of production centres and trying to understand the extent of distribution circuits.

In 2004, two works were published after two important conferences in Rome and Turin, summarising the new state of research especially for northern Italy.[26] However, it was in 2007 that Gelichi proposed some models for early medieval ceramic production and consumption in

[22] On glass conclusions have been recently reached for the fifth and seventh-century coastal areas, in particular in Torcello and the Venetian Lagoon (S. Gelichi *et al*., 'Importare, produrre e consumare nella laguna di Venezia dal IV al XII secolo. Anfore, vetri e ceramiche', in S. Gelichi – C. Negrelli (eds.), *Adriatico altomedievale (VI-XI secolo) Scambi, porti, produzioni* (Venezia 2017): 23-114) but for inland territories research must be more consistent and developed.

[23] For a complete bibliography concerning these early reports see G.P. Brogiolo – S. Gelichi, 'La ceramica grezza medievale nella pianura padana', in *La ceramica medievale nel Mediterraneo Occidentale. Atti del III Congresso Internazionale organizzato dal Dipartimento di Archeologia e Storia delle Arti dell'Università degli Studi di Siena e dal Museo delle Ceramiche di Faenza (Siena-Faenza 1984)* (Florence 1986): 293.

[24] *Ibid*.: 293-316.

[25] Id. (eds.), *Le ceramiche altomedievali (fine VI-X secolo) in Italia settentrionale: produzione e commerci* (Mantova 1996).

[26] S. Patitucci-Uggeri (ed.), *La ceramica altomedievale in Italia* (Florence 2004), and G. Pantò (ed.), *Produzione e circolazione dei materiali ceramici in Italia settentrionale tra VI e X secolo* (Mantova 2004).

the entire Italian peninsula, recognising three macro areas with peculiar and distinctive patterns: northern, central and southern Italy.[27] According to Gelichi, the production and circulation patterns were simpler in the north compared to the south, with a richer and varied evidence in southern Italy compared to the ceramic materials found in the Po valley.[28] However, even if northern Italy has been described as the poorest territory for ceramic evidence, Gelichi stressed again the necessity for further analyses in this area. In fact, according to him, it is still important to keep in mind that the study of the Po valley context shows that – despite this lack – the economy was not just a subsistence economy. Instead, the reality that emerged from the material evidence is the presence of quite complex production and distribution patterns.

The most recent overview on early medieval ceramic and soapstone evidence was given by Federico Cantini in his important contribution in the volume *Italy, 888-962: a turning point* published in 2013, providing a clear picture of the actual state of research, and trying to expose the regional differences especially within the Po valley.[29]

Since then, research on early medieval ceramic and soapstone evidence in northern Italy has developed with substantial differences compared to those studies realised for high and late medieval sites and evidence. For pottery between the seventh and tenth centuries especially, the discontinuity of material evidence has left scholars with an incomplete and fragmented scenario that has to be analysed in ways different from earlier periods. The gap between two relatively well-known phases (late antiquity and the high middle ages) is still evident but, especially after the 1980s, scholars and archaeologists began to identify the particular characteristics of the ceramic evidence for the early middle ages.[30] In general, it is possible to define the evolution of both fine and coarse ware production of the period between the end of the seventh and the end of the ninth centuries as characterised by technological decline, reduction in the number of forms, prevalence of grey clay and soapstone, and restricted production and distribution circuits with an episodic presence of Lombard production types.[31]

On the other hand, starting from the mid-ninth century, there seems to be a reorganisation of production with some changes: first, the introduction of finer pottery with local differences and standardised productive characteristics, in particular single-fired glazed

[27] S. Gelichi, 'Gestione e significato sociale della produzione, della circolazione e dei consumi della ceramica nell'Italia dell'alto-medioevo', in *Archeologia e società tra tardo antico e alto Medioevo* (Mantova 2007): 59-61.
[28] For an accurate overview of ceramic evidence in southern Italy see P. Arthur – H. Patterson, 'Ceramics and early medieval central and southern Italy: a potted history', in Francovich – Noyé (eds.), *La storia*: 409-441.
[29] F. Cantini, 'Produzioni ceramiche ed economie in Italia centro-settentrionale', in Valenti – Wickham (eds.), *Italy, 888-962*: 341-363.
[30] S. Patitucci-Uggeri, 'Introduzione', in Id. (ed.), *La ceramica altomedievale*: 7-9.
[31] *Ibid.*: 8.

"*ceramica depurata*". Second, a distribution following internal watercourse routes seems to be more evident, emphasising the role of the rivers as promotors of mobility and exchange.[32]

Keeping in mind these concepts, the chapter aims now to explore the principal characteristics of this period of early medieval ceramic evidence following a division according to the types of recognisable local and long-distance circuits, preserving the role of rivers and watercourses especially for the distribution patterns linked to single ceramic types.

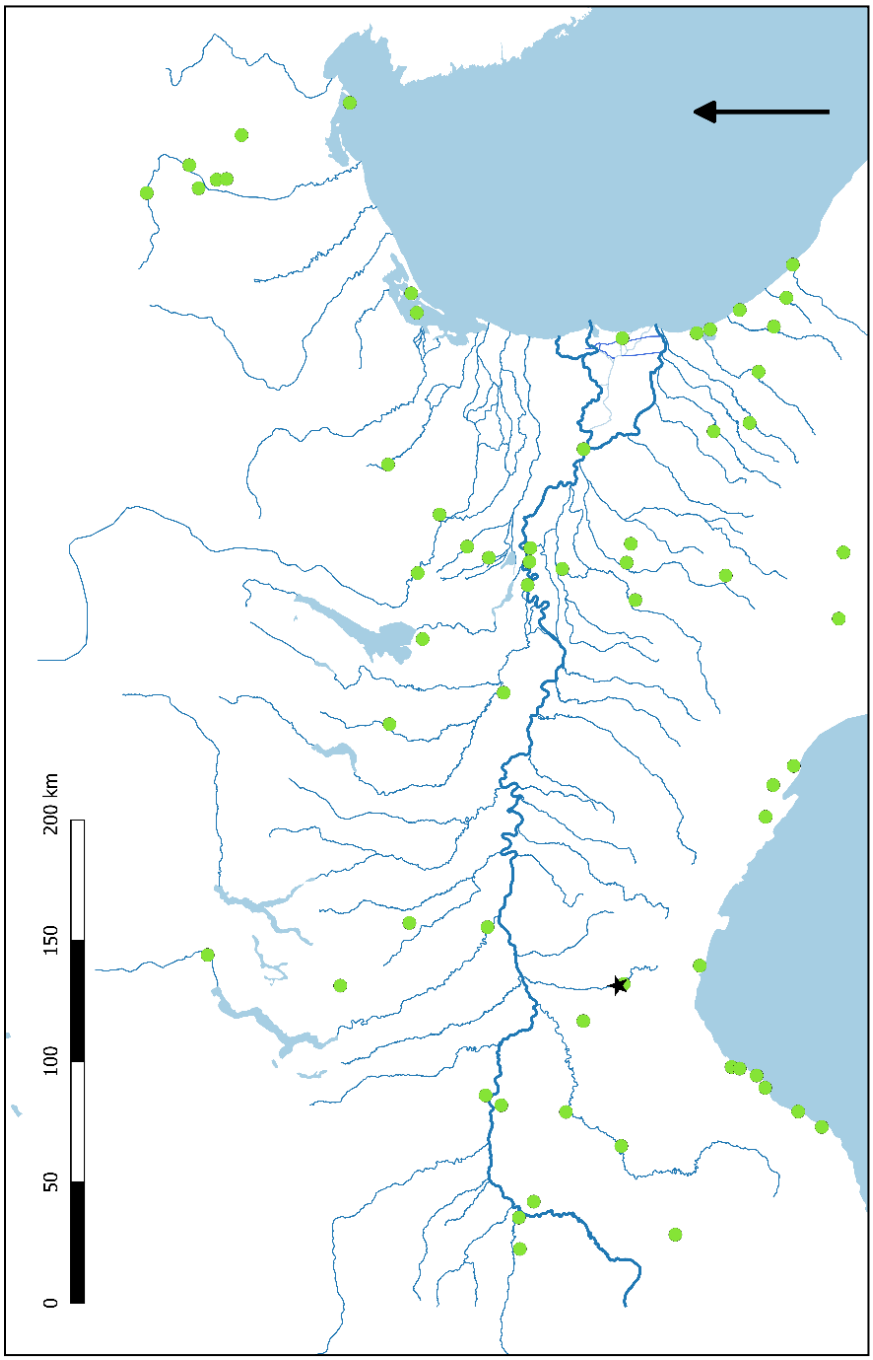


Fig. 16: Ceramic sites in the Po valley cited in the text and Libarna kiln, relaboration from Cantini, 'Produzioni ceramiche': 341-363.

[32] *Ibid*.: 8.

4.1.1. The local circuits

Starting from the western part of the Po valley and moving eastward, it is possible to recognise peculiar features almost related to the modern regions and provinces that define northern Italian ceramic evidence patterns at the end of the early middle ages. Trying to regroup the main tendencies for ceramic production and distribution patterns, it is possible to see three different macro areas in the Po valley.[33] The first is the westernmost part including Piedmont, Liguria (partially), and the western part of Lombardy. A second area can be seen in the central Po valley between Lombardy, Veneto and Emilia. Finally, we can consider all the eastern part of Veneto and Friuli.

Western-central northern Italy

Considering the production patterns in the far western part of northern Italy, the present-day region of Piedmont has to be given particular attention. This interest is motivated by the presence in this region, in the ancient Roman city of Libarna in the modern province of Alessandria, of the only known and excavated example of ninth-century kiln in northern Italy.[34] According to the estimate made by the excavators, production was around 800 to 1500 pots per month and, given its position near the *Via Postumia*, its products circulated within a range of approximately 50-70 kilometres within the surrounding mountain and river valleys which conditioned and in part limited the circulation.[35] The archaeobotanical analysis shows that the fuel was wood – mainly chestnut, oak, hornbeam, apple and pear wood, hawthorn – easily obtained from the surrounding hilly and mountainous areas.[36] This productive site may have hosted several artisans given its size. Also, the number and variety of forms seems to indicate the presence of at least one – or more – specialised workers. However, the social structure of any settlement there remains obscure: according to the evidence, it is not possible to say if it was a place for a community of artisans or just a kiln in which singular workers could perform independently.

Extending the analysis to include other sites in Piedmont, another interesting aspect is the presence of specialised centres – like Libarna – that seem to coexist with other sporadic activities. Even if the period between the eighth and ninth centuries is less evident in the material culture, the main forms and materials that have been found are grey clay *ollae* with

[33] Cantini, 'Produzioni ceramiche': 362.
[34] F. Filippi *et al*., 'La produzione di una fornace altomedievale per ceramica da Libarna (AL)', in Pantò (ed.), *Produzione e circolazione*: 57-83. Cantini, 'Produzioni ceramiche': 347.
[35] *Ibid*.: 347.
[36] Filippi *et al*., 'La produzione': 60-62. For archaeobotanical data in northern Italy see also above at Chapter 1.3.

lids, designed for domestic storage and cooking purposes.[37] It is possible to recognise a continuity both in forms and materials deriving from sixth- and seventh-century traditions that has principally been found in funerary contexts both in rural sites – such as Mombello, Monferrato (AL) and Centallo (CN) – and urban and extra-urban areas – such as Asti, Turin and Pecetto-Bric S. Vito (TO).[38] These traditions derived from different socio-cultural contexts: one is related to a Roman-Byzantine set of techniques – particularly in pre-existing Roman urban sites – that, for example, referred to glazed ceramic evidence; another trend – that represents the majority of the material found – shows the presence of peculiar oriental barbarian tradition in the new settlements that might reflect Lombard ceramic features. However, the spread of different traditions in the region is important allowing us to recognise that, according to the ceramic evidence, there was not a clear separation between the Byzantine sphere of influence and the areas in which the Lombards extended their control. However, the present-day state of research does not allow to identify specific ethnic cluster in northern Italy linked to precise production centres. It only allows the recognition of different traditions living together and not restricted to limited areas.

The permeability of borders in the distribution of decorative motives and pottery forms may be noted not just within the Po valley, but also as regard other boundaries. In fact, another curious aspect of the ceramic evidence in the western Po valley is the presence of similarities with some productions from southern French sites. Comparing the sites of Turin, Precetto-Bric S. Vito, Trino (VC), Fugarolo (AL), Centallo and Alba (CN) with those in Bollène and Vaucluse in the central and southern Rhône valley, similarity can be seen especially in the production of *ollae* with convex bases, between the ninth and tenth centuries.[39] This similarity is important because it may represent a stronger connection between the two sides of the Alps after the conquest of northern Italy by Charlemagne and especially during the reign of his grandson Lothar.

Apart from westward transalpine connections, other links have been found between eastern nearby areas as regards production and distribution patterns. In particular, the two

[37] M. Negro Ponzi, 'Ceramica altomedievale nel Piemonte', in Patitucci-Uggeri, *La ceramica altomedievale*: 11-19.

[38] For a recent overview of the materials in Piedmont see N. Botalla Buscaglia, *Materiali in ceramica e pietra ollare nel Vercellese tra tardoantico e altomedioevo. Caratteristiche produttive e distributive per uno studio integrato del territorio*, PhD Thesis (Sapienza University of Rome 2013).

[39] Cantini, 'Produzioni ceramiche': 347, G. Pantò, 'Ceramiche altomedievali dai nuovi scavi di Torino', in Patitucci-Uggeri (ed.), *La ceramica altomedievale*: 37-58. For the comparison with the Rhône valley see A. HORRY, 'La céramique dans la moyenne vallée du Rhône (VI^{e}-XIII^{e} s.)', in O. Maufras (ed.), *Habitants, nécropoles et paysages dans la moyenne et la basse vallée du Rhône (VII^{e}-XV^{e} s.). Contribution des travaux du TGV-Méditerranée à l'étude des sociétés rurales médiévales* (Paris 2006): 363-406; G. Pantò, 'Produzione e commercio di vasellame d'uso domestico tra la fine del mondo antico e il Medioevo', in L. Marcando – E. Micheletto (eds.), *Archeologia in Piemonte. Il Medioevo* (Turin 1998): 282-283.

modern regions with strong similarities with Piedmont are Liguria and the western part of Lombardy, the closest areas. Starting with the former, in the historiography on early medieval Po valley, the analysis of the connection between the two sides of the Apennines – the Po valley and the Ligurian coast – has been considered secondary. In fact, research was focused on evidence that linked the markets like Pavia, Milan, Piacenza and Cremona with the Adriatic cities leaving aside analyses of hypothetical circulation between the western Po valley and Liguria. However, ceramic evidence seems to indicate the presence of tangible connections between the Po valley and the Ligurian coast. In some sites in Piedmont, it is possible to recognise similar features both in production and distribution patterns.

In general, there are few archaeological excavations in Liguria with ceramic materials dating to the eighth and ninth centuries. One of the main places in which excavations have been carried out is in the city of Genoa at via S. Vincenzo, S. Silvestro, S. Lorenzo, Mattoni Rossi and Scuole Pie.[40] Another important area is the province of Savona, where the *Istituto Internazionale di Studi Liguri* focused its attention on the sites of Albenga, Pieve del Finale, Vado Ligure, Andora, and San Paragorio di Noli. For the eastern coast, the main site is Luni.

Throughout Liguria, the main form was again the *olla* for domestic and cooking purposes, characterised by local production and limited distribution. In these areas the late antique tradition continues after the fifth century, but especially starting from the seventh century it is possible to notice a contraction of previous exchange networks as shown by the disappearance of northern African and Mediterranean pottery. According to the most recent interpretation by Carlo Varaldo, this period of Ligurian pottery, beginning in the seventh century, reflects a reduced local economy compared to the Roman and late antique periods.[41] In fact, according to Varaldo, the Ligurian economy was deeply conditioned by Mediterranean exchange networks. This explanation could be described as openly *Pirennian*, giving much importance to the role that Saracens played in that part of the Mediterranean Sea. Since the end of the tenth century, the rapid increase in circulation of new ceramic types in the whole Tyrrhenian area as well as the reprise of the circulation of earlier models like *forum ware* from Latium are other aspects linked to a change in Saracen piracy activity.

Similarly, for the period between the eighth and early tenth centuries, even connections with the Po valley are difficult to trace. New openings to the Ligurian coast are proven by some decorated pottery found at Pecetto-Bric San Vito in Piedmont at the end of the tenth century, but in general Ligurian pottery distribution is strictly local. This apparent isolation of Liguria in exchange networks is strange given its proximity to the Mediterranean Sea, and the traditional

[40] C. Varaldo, 'La ceramica altomedievale in Liguria (VIII-X secolo)', in Patitucci-Uggeri, *La ceramica altomedievale*: 119-148.
[41] *Ibid*.: 144.

explanation must be revised, looking beyond the simple presence of pirates in that part of the sea. In fact, even in the Adriatic area, Arabs and Byzantine aggressions did not facilitate trade, but exchange and movement of goods continued throughout the ninth century. Furthermore, the written sources regarding Liguria describe a completely different situation, testifying many connections between Ligurian and Milanese ecclesiastical elites.[42] Genoa and the other Ligurian centres were, therefore, far from being completely isolated and self-sufficient. This issue needs further investigation both from an archaeological and documentary perspective in order to formulate better explanations regarding the position of Liguria in exchange and market dynamics and its links with the Po and its tributaries.

As regards the connection between Piedmont and Lombardy, the ceramic evidence includes a certain number of interesting artefacts. The most studied form is the glazed spindle whorl of the period between the eighth and tenth centuries.[43] Its distribution, however, increased exponentially in particular after the tenth century. In this regard, the excavations at San Michele di Trino are very important. Here, the excavations under the church brought to light many glazed fragments indicating the presence, perhaps, of a furnace destroyed during the invasion of the Hungarians in the tenth century. *Olla* of a similar type of glaze has also been found in Brescia near Santa Giulia and in Milan, allowing a circulation of barbarian traditions and techniques between Piedmont and Lombardy to be recognised.[44]

Finally, according to Claudio Negrelli, between the eighth and ninth centuries it is also possible to identify other particular ceramic forms that imitate models already noted in the *forum ware* of Latium.[45] The same forms reminiscent of *forum ware* have been discovered also at the site of Santa Giulia di Brescia, a location quite far from Piedmont (and Latium of course), in the central part of the Po valley. Nevertheless it is interesting to note these similarities which could suggest connections between the two regions enlarging the range of circulation of production traditions in the main centres of the Po valley.[46] Furthermore, the circulation of similar traditions is attested not only for glazed pottery and the reprise of *forum ware* between these regions but, especially looking at more extended networks, it is possible to recognise similar trends that extended over the entire central section of the Po valley and beyond.

---

[42] G. Vocino, *Santi e luoghi santi al servizio della politica carolingia (774-877): Vitae e Passiones del regno italico nel contesto europeo*, PhD Thesis (University Ca' Foscari Venice 2010): 258-267.
[43] Cantini, 'Produzioni ceramiche': 348; M. Sannazzaro, 'La ceramica invetriata tardo antica-altomedievale in Lombardia. Le produzioni più tarde', in Patitucci Uggeri (ed.), *La ceramica altomedievale in Italia*: 103-118.
[44] *Ibid*., pp. 112-114.
[45] C. Negrelli, '(In)visibilità dell'alto medioevo: vasellame e strutture insediative nella parte orientale dell'Emilia-Romagna', in G. Volpe – P. Favia (eds.), *V Congresso Nazionale di Archeologia Medievale* (Florence 2009): 557-562.
[46] *Ibid*.: 560-562.

Central-eastern northern Italy

In this central section of the Po valley, it is possible to recognise distribution and production patterns with common models and types for areas north and south of the Po, in sites close to watercourses. First, the circulation and use of particular materials – like soapstone and glazed pottery – is evident in Lombardy, Veneto and Emilia. These materials spread alongside manufacturing techniques involving the use of the fast wheel. The movements of similar types, materials and manufacturing techniques prove the presence of quite extensive networks that seem to characterise this section of the Po valley.[47]

The use of soapstone to make simple artefacts had been common since late antiquity in both urban and rural contexts and was continuous throughout the early middle ages, with wide distribution from the Alpine valleys, where the production centres were situated, throughout the Po valley with some finds even in Liguria and in Friuli, at the eastern edge of northern Italy.[48] Given their distribution, soapstone is an important indicator for circulation routes linking the Alps and the main course of the Po and beyond, as can be seen in Fig. 17 below.

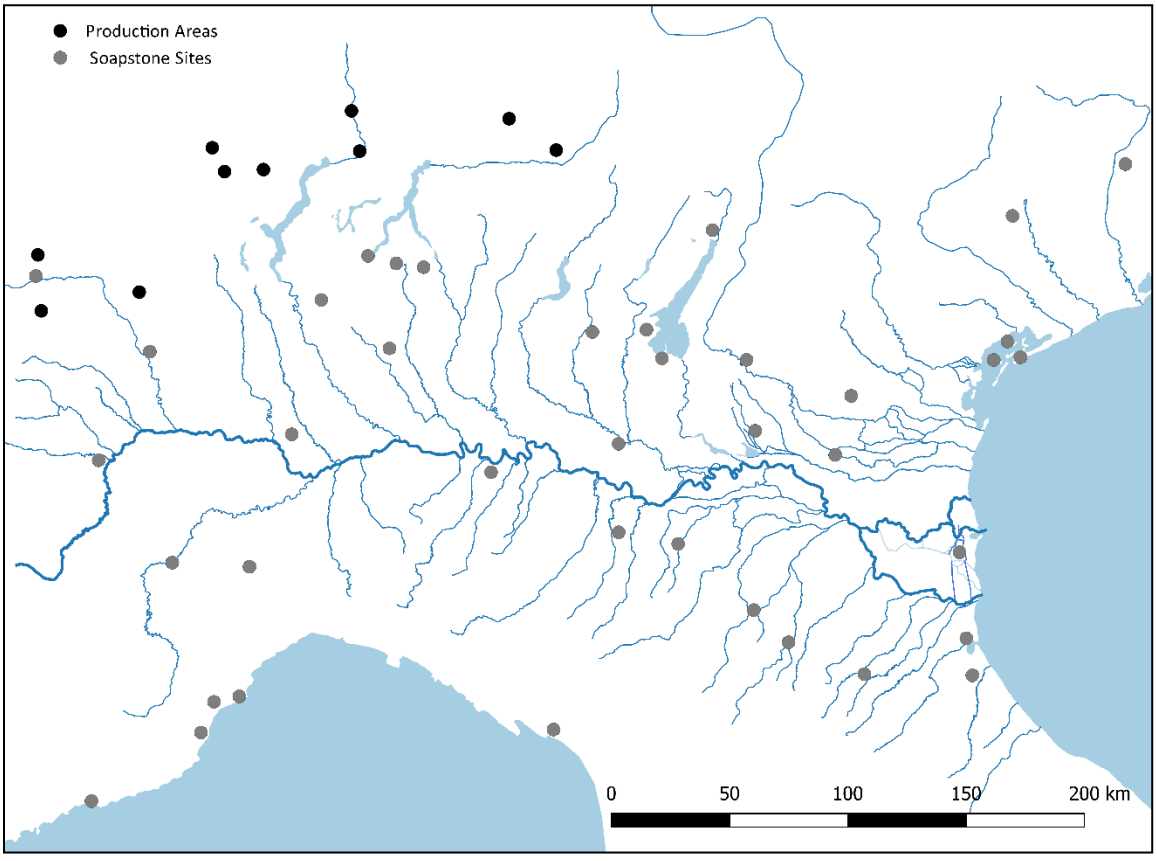


Fig. 17: Soapstone circulation in northern Italy (6th-10th c.). Re-elaboration from Alberti, 'Produzione': 334

[47] *Ibid*.: 557-562.

[48] A. Alberti, 'Produzione e commercializzazione della pietra ollare in Italia settentrionale tra tardoantico e altomedioevo', in S. Gelichi (ed.), *I Congresso Nazionale di Archeologia Medievale* (Florence 1997): 335-339.

However, soapstone use in the specific period between the eighth and long ninth centuries does not seem to follow the same patterns in every site. For example, the materials in Milan compared to that in the Valtellina or near Brescia seems to increase exponentially, while at other sites it seems to follow an opposite trend, characterised by a reduced frequency.[49] It is possible that its use in economic or domestic activity depends on the particular area analysed. It may be, in fact, that in each locality there were different traditions that might have different uses for these containers and the material from which they were made. Unfortunately, research on this interesting material is still at an early stage focusing in particular on the alpine areas and the local circuits around the production sites.[50] At present, a precise reconstruction of the local and wider circuits in the Po valley is still lacking.

From the second half of the ninth century, a new ceramic assemblage, linked to kitchen storage and cooking, known as the Piadena ware starts to spread especially in the Veneto – where some evidence was also found from the first half of the ninth century – and Lombardy, reaching also the southern Po plain in eastern Emilia (Fig. 18). A few examples of Piadena ware are found also in Friuli (Grado is the most easterly site where Piadena ware is found) and Romagna, but in small numbers. Piadena ware is characterised by comb-like walls, and includes an assemblage formed of topped ovens, high handled and pierced pans, *ollae* and pots. The type of sites in which this kind of pottery has been found varies: the distribution includes rural centres (that later became castles starting from the tenth century) such as Nogara, Bovolone (VR) and Rontana (RV), urban sites (Brescia, Milan, Pavia, Verona, and Ferrara) and monasteries (San Benedetto Po, Sant'Agata Bolognese).[51] In these sites the principal forms seem to be limited to spindle whorls founded in excavations both in urban contexts, like in Milan and Brescia, and rural sites, like Piadena and Nogara.[52]

Apart from the circulation of these main materials, certain sites in the Veneto and Emilia attest the presence of other more restricted traditions that connect different places in the central Po valley. For example, I shall mention San Benedetto Po. Here, excavations were conducted between 1989 and 1994, especially inside the monastery. The material was studied by Silvia Lusuardi Siena starting in the early 2000s and was published, at the end of the decade.[53] It is particularly useful to compare the pottery from San Benedetto Po with other sites in the

[49] *Ibid*.: 336.
[50] R. Fantoni *et al*. (eds.), *La pietra ollare nelle Alpi. Coltivazione e utilizzo nelle zone di provenienza* (Florence 2018).
[51] N. Mancassola, 'La ceramica grezza di Piadena (CR). Secoli IX-X', in Brogiolo – Mancassola (eds.), 'Scavi al castello di Piadena': 143-172.
[52] Negrelli, '(In)visibilità': 557-562. Cantini, 'Produzioni ceramiche': 354.
[53] For an overview of the excavation see S. Lusuardi Siena – C. Giostra, 'San Benedetto Po: l'abbazia di Matilde di Canossa. Archeologia di un grande monastero dell'Europa benedettina', in M.C. Somma (ed.), *Cantieri e Maestranze nell'Italia Medievale. Atti del Convegno di studio, Chieti - San Salvo, 16 - 18 maggio 2008* (Spoleto 2010): 483-498.

central Po valley. In fact, there are parallels with material from Piadena as regards both forms and decoration, like, for example, the presence of topped ovens. Not only with the Piadena ware, but also other local forms found in the northern Po plain – such as large bowls – have tenth-century parallels with material in the territory of Mantua, specifically at Quingentole and Pieve di Coriano. Even in the low plain of Brescia – at sites like Casaloldo, Cittanova and the *castrum* of Santo Stefano in Vicolongo or Concordia[54] or in the southern Po plain – as in the already cited fortified village of Sant'Agata Bolognese – it is possible to see parallels with the material and forms found at San Benedetto Po.

A similarly interesting site, specifically for the Emilia area, is the above-mentioned locality of Crocetta near Sant'Agata Bolognese. [55] The pottery assemblage for this site gives us an overview of ceramic vessel production and consumption patterns for the villages in this section of the Po plain. In fact, excavation brought to light good samples of material of the late ninth and tenth centuries that, according to the data analysis, testify the presence of a plurality of forms in this area. The main forms are shared report with the central Po valley – such as the already cited Piadena ware – that spread in these territories along the rivers. The production mainly consisted of small jars with lids and *ollae*, probably used for transporting spices and salt. Of course, as seen in the other areas of the Po valley, much of the production was of local types and techniques, seen in forms such as handled pans. Rarer, but still found at Sant'Agata, are single-fired glazed ceramics that prove an improvement in terms of production techniques starting from the tenth century. Once again, Sant'Agata shows a quite complex picture that seems to reflect a wide range of consumers.[56]

Overall, the spread of wares like Piadena ware in northern Italy attests a quite large area of circulation, especially along the watercourses, confirming the use of rivers for the spread of this type of products. The same containers could also have been used for more valuable products like salt and spices, and not restricted only to the transport of local food and goods. Therefore, it is possible to suppose the presence of two kinds of trade: one more local and a second, wider and related to the river networks. In both these trades the role of urban demand and of intermediaries – such as monasteries and merchants – was crucial in connecting rural and urban areas, as Cantini has pointed out.[57] However, the lack of evidence for the initial decades of the ninth century remains a mystery and needs further analysis and explanations.

[54] Brogiolo – Gelichi, 'La ceramica grezza': 303.
[55] For S. Agata see F. Sbarra, 'La ceramica di un villaggio di X secolo nell'area padana: produzione e circolazione', in R. Curina – C. Negrelli (eds.), *1º Incontro di Studio sulle Ceramiche Tardoantiche e Alto Medievali* (Mantova 2002): 95-124; Gelichi – Librenti, 'Un villaggio': 101-117.
[56] Cantini, 'Produzioni ceramiche': 348-349.
[57] *Ibid*.: 362.

The reprise of more specialised production in the second half of the century and the increase of this kind of manufacturing during the tenth century point to a renewal of the market and a more specific demand from consumers. However, another point that should be investigated is linked to the study of the workshops where these products were made. Unfortunately, this last point would imply much more field work and excavations in selected sites than are presently available.

Eastern northern Italy

The reconstruction of the eastern networks of production and distribution of ceramics from the end of the early medieval period suggests both similarities and differences with the western and central sections of the Po valley. For example, the Piadena type fragments recognised in Grado show evidence of a circulation of techniques and traditions also including these eastern territories of northern Italy, but other examples seem to highlight more the contrasts. In the Veneto region, in fact, the ceramic production and circulation patterns follow more local trends looking both at rural and urban sites. The result is far more complex and varied picture compared to the other areas of the central Po valley. In fact, apart from more homogenous sites such as Piadena and San Benedetto, that still attest shared features with the other areas in Lombardy and Emilia, the sites of Nogara, Verona, Arcole, and Vicenza have less variety as regards pottery.[58] The main trend in these sites is still the production of limited forms, of which covered jars and *ollae* are the most common. Another peculiar characteristic of these sites is the poverty of eighth-century material compared to the evidence for the seventh and ninth centuries. The interesting aspect is that usually in other regions, the beginning of the ninth century is the period characterised by a more significant lack of evidence. In this case, the contrast could be explained by the fact that, even if the Veneto area was in the same early medieval political context of the Po valley, its watercourses are part of a different hydrological basin. This separation may be the cause of differential development, as well as the fact that centres like Vicenza or Arcole were minor centres compared to others in the central section of the Po valley, moving the core of interregional exchange circuits far from these markets. Nevertheless, this explanation must be purely hypothetical and would need more material analyses not available at present.

Moving to the easternmost part of northern Italy, in Friuli a tradition is evident that, as in Piedmont, derives from the nearby transalpine territories, but underlines a local production similar to the general trend of Veneto sites. The diffusion of a specific *fond marqué* ceramic form testifies a production with many connections to Croatian/Slovene traditions of the eighth and ninth centuries. However, this kind of production was not limited to the eastern part of Friuli.

[58] S. Lusuardi Siena *et al*., 'La ceramica altomedievale tra Lombardia e Friuli', in Patitucci Uggeri (ed.), *La ceramica altomedievale*: 71-72.

According to Alessandra Negri and Silvia Lusuardi Siena, this eastern Adriatic influence can also be seen in some sites in Piedmont (particularly in Trino), allowing us to recognise in this case a possible interregional circulation of decorative types and a deeper connection between the eastern Adriatic coast and the western Po valley.[59]

Another characteristic of the archaeological situation in Friuli is the fact that here the number of rural sites is much greater compared to the urban ones. In this perspective, the imbalance between the two site types does not allow us to have a complete overview of ceramic production, circulation and distribution within the region. The main site types are hilltop sites and cemeteries notably the sites of Invillino, San Daniele del Friuli, San Martino a Rive d'Arcano, Castelraimondo di Forgaria, and medieval *castra* such as in Udine, Ragogna and Osoppo.[60] However, it is interesting that for Cividale – the most important political centre of the area – there is not enough material to provide a more general overview.

4.1.2. Long-distance networks and finer production

The principal material signs of finer and larger circuits of exchange in northern Italy and the Po valley are evident in those territories in closest contact with other political realities and not directly influenced by a Franco-Lombard tradition. These peripheral areas principally include the Adriatic lagoon and coastal areas (mainly, Comacchio, Venice and Grado), Romagna but also – in part – some coastal centres in Liguria.

These territories are characterised by a finer production compared to the other areas in the Po valley with purified clay as the principal material for wares. The range of circulation for these types is quite large, covering areas in Emilia-Romagna, the Marche, Verona and the Venetian Lagoon. Unfortunately, the chronological limits of this production are still uncertain but can be generally simplified to the ninth century.[61] However, it seems plausible that this production was developed during those years – at the end of the eighth century – for which there is a general lack of evidence, considering other pottery material in the Po valley.[62]

Nevertheless, the finds in these areas allow us to identify distinctive forms: small amphorae with flat bases and incised decorative motives are the most common. Another interesting form which is characteristic of these peripheral areas is the globular amphora. This container was probably used for wine import, export and storage and attests a strong

[59] A. Negri, 'La ceramica grezza medievale in Friuli-Venezia Giulia' in S. Lusuardi Siena (ed.), Ad mensam. *Manufatti d'uso da contesti archeologici fra tarda Antichità e Medioevo* (Udine 1994): 63-96; Lusuardi Siena *et al*., 'La ceramica altomedievale': 65-66.
[60] Lusuardi Siena *et al*., 'La ceramica altomedievale': 79-91.
[61] C. Negrelli, 'Produzione, circolazione e consumo tra VI e IX secolo: dal territorio del Padovetere a Comacchio' in Berti *et al*. (eds.), *Genti nel delta*: 437-472.
[62] Id., '(In)visibilità': 557. Cantini, 'Produzioni ceramiche': 355.

connection with a Mediterranean, especially Aegean, tradition.[63] Globular amphorae started to circulate mainly in coastal areas, especially at those sites associated with a port and exchange between the end of the seventh and the ninth century.[64] Among these are Grado, Venice, Torcello, Comacchio, Classe, Rimini, Cervia and also – but more inland – Cesena.[65] Moreover,

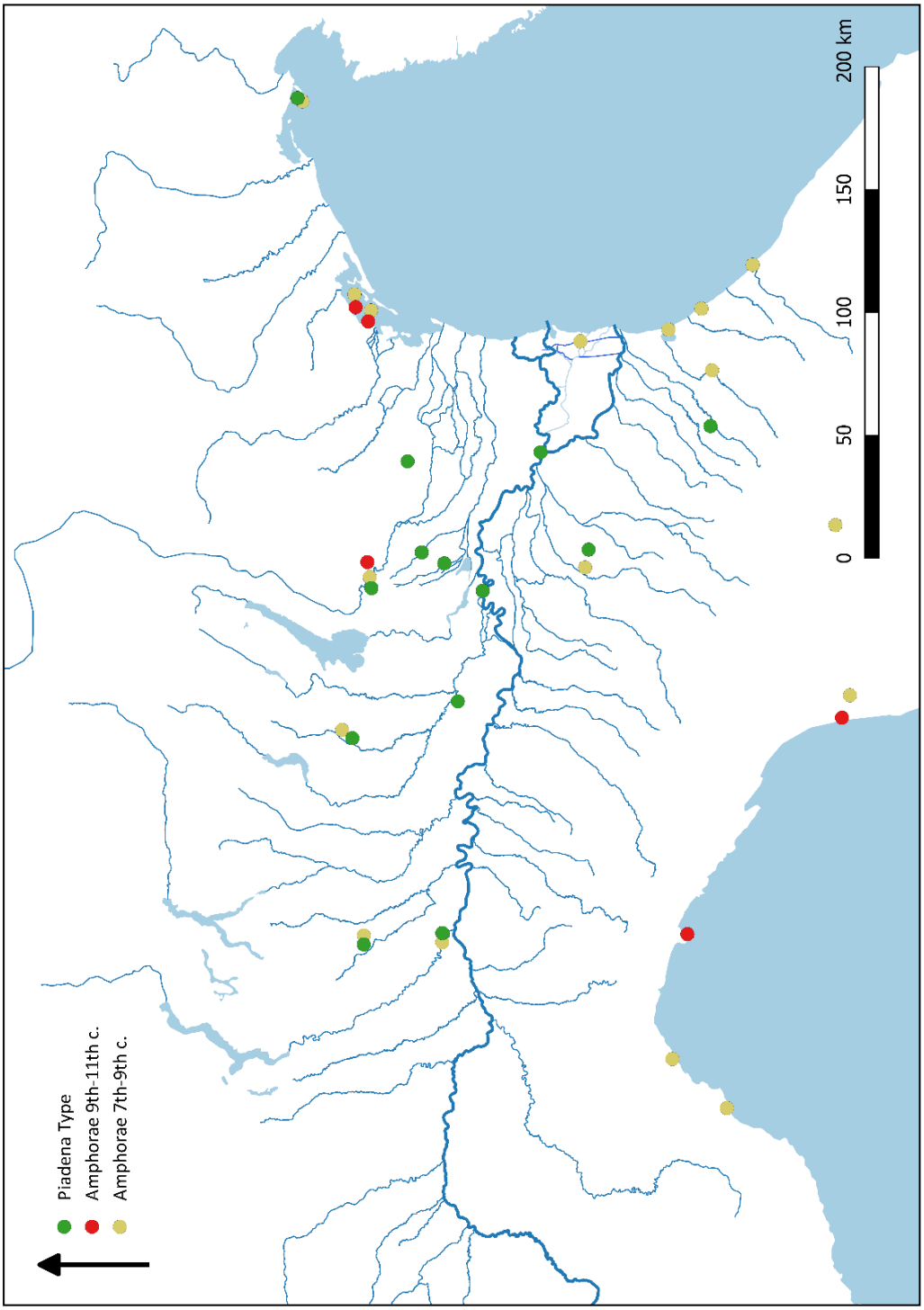


Fig. 18: Special types' distribution in northern Italy. After Cantini, 'Produzioni ceramiche': 341-

[63] Negrelli, 'Produzione': 396-398.
[64] *Ibid*.: 408-409.
[65] Gelichi, 'Tra Comacchio e Venezia': 365-386; C. Negrelli, 'Towards a definition of early medieval pottery: amphorae and other vessels in the northern Adriatic between the 7th and the 8th centuries', in Gelichi – Hodges (eds.), *From one sea*: 415-438: E. Cirelli, 'Anfore globulari a Classe nell'alto Medioevo', in Volpe – Favia (eds.), *V Congresso*: 563-568. Cantini, 'Produzioni ceramiche': 356.

the circulation of these amphorae also reached inland centres like Verona, Brescia, Milan, Nonantola and perhaps Pavia,[66] as well as the ports of the Ligurian coast like Savona and *Castrum Petri* (near Finale) in Liguria,[67] and the Tuscan coast – as attested by the excavations at Piazza Duomo in Pisa.[68]

These containers, however, seem to decrease at the beginning of the ninth century in the period when the Adriatic ports became the principal gateways for the Mediterranean exchange of the Frankish empire.[69] Their circulation seems to be reactivated in the second half of the ninth century when the vitality of Venice and the other Adriatic centres increases exponentially.[70] In this case, the problem is to identify: a) the reason why in the supposed golden age of the Carolingian domination in Italy and Europe this kind of production and distribution seems to stop, and b) how they eventually were replaced, if they were. Trying to answer these questions, it is possible to hypothesise the presence of perishable materials like wood for containers linked to the transport of goods. However, the reason why the production and distribution markedly declined in the first half of the ninth century remains a crucial topic to be investigated through archaeological and historical research.

In the same lagoon areas and in Romagna, glazed objects provide information on decorative motifs linked to local amphorae production. In Torcello, in particular, the few materials seem to emphasise the presence of a glazed kiln dated to the ninth century.[71] These finds once again attest the presence in these territories of a finer local production along with a distribution that could imply a major role played by those intermediaries – like merchants – along river and maritime routes, which seem to be the principal spot for trade (see Tab. 5).[72]

However, alongside this finer production, some similarities have been noticed in forms like, for example, the *ollae* that from the ninth century start to spread along the road routes. These artefacts were still linked to domestic storage and cooking purposes (Fig. 16, 17), confirming the main trend of the use of pottery already noticed in different sites in the whole Po valley.

---

[66] Negrelli, '(In)visibilità': 559; Id., 'Towards a definition': 407-413.
[67] Varaldo, 'La ceramica altomedievale in Liguria': 143.
[68] E. Vaccaro, *Sites and Pots: Settlement and Economy in southern Tuscany (AD 300-900)* (Oxford 2011): 150-152; Cantini, 'Produzioni ceramiche': 356.
[69] See above Chapter introduction.
[70] Gelichi, 'Tra Comacchio e Venezia': 385. G. Murialdo, 'Alto-Adriatico e Alto-Tirreno nel mondo Mediterraneo: due mari a confronto tra VI e X secolo', in S. Gelichi (ed.), *La circolazione delle ceramiche nell'Adriatico tra tarda antichità e altomedioevo* (Mantova 2007): 9-29.
[71] Negrelli, 'Towards a definition': 404-405.
[72] The material evidence for these intermediaries is particularly difficult to find. However, looking at the written documentation, examples of these characters are evident as in the Capitulary of Liutprand for the inhabitants of Comacchio (715-730).

Interregional circulation derived from a Mediterranean tradition is, nevertheless, more marked along with a finer production in this area near the coast, with particular reference to the material found near Venice and the delta area. The distribution of these types attests a spread of commercial routes also in the main centres of the inland Po valley, extending the economic perspectives of the Po valley centres to a wider Mediterranean area.[73]

4.1.3. Considerations

After having briefly summed up the complex reality of ceramic patterns for the eighth- and early tenth-century northern Italy, it is possible to formulate some final considerations regarding the socio-economic picture of this period. In fact, as often applied in the study of medieval economy in the Italian peninsula, the study of ceramic evidence allows different economic patterns linked to both production and distribution to be understood, even if many limits are evident.[74] In fact, for the period between the seventh and ninth centuries, the use of pottery as indicator of economic activity is not always applicable. The local variety of forms and exchange circuits and the lack of evidence are quite contradictory, not providing a clear picture of the connection between production and distribution centres. Until research provides more tangible evidence, the only possibility for scholars is to formulate hypotheses. Particularly for the eighth and early-ninth centuries, the situation is more complex considering that for previous and subsequent periods the presence of larger databases allows more defined overviews.[75] From a social perspective, however, ceramic evidence underlines the fact that Lombards and Carolingians – at least until the second half of the ninth century – did not originate an evident new tradition of production and circulation models, instead the new pottery systems followed pre-existing Roman-Byzantine and barbarian traditions.

Following this impossibility to connect ceramic evidence with the effective trends of the economic activity, another traditional reading of these materials must be reinterpreted. In fact, the use of ceramic evidence for dating purposes of archaeological layers is also often impossible. This is especially due to two main reasons. First, it is hard to identify peculiar patterns that characterised a specific period (particularly the Carolingian phase), recognising just the patterns linked to the eighth and ninth centuries and not those associated to a specific society or

[73] Negrelli, 'Towards a definition': 413

[74] On the importance of pottery as a tool for economic history, specifically for the Italian scenario, see A. Molinari, 'La ceramica medievale in Italia ed il suo possibile utilizzo per lo studio della storia economica', in *ArchMed* 30 (2003): 519-528. Here the author stresses the importance of pottery as an indicator of social status, analysing availability and the demographic level of demand.

[75] For example, in 2010, Alessandra Molinari focused on the possibility of using ceramics as an economic indicator for the late medieval period, while Federico Cantini – three years later – argued once again the difficulty of using ceramic evidence to determine economic patterns in early medieval northern Italy: Cantini, 'Produzioni ceramiche': 346-347.

population. Secondly, there is a more technical issue: all the ceramic evidence for the period between the seventh and ninth centuries has been principally dated because it was found in early medieval layers in different sites of northern Italy. For this reason, it was not the ceramic materials that dated the early medieval layers of the sites, but other materials were necessary in order to provide a specific dating like, for example, buildings, pollen or archaeobotanical and dendrological evidence, analysed through radiocarbon dating.[76]

Besides these problematic issues regarding the use of ceramic evidence in northern Italy from the end of the early medieval period, after having outlined the various cases and patterns, it seems to be generally recognised that something started to change from the second half of the ninth century, as observed also in patterns of settlement. This development of local production, especially in the tenth century, can be explained by two factors, as Federico Cantini shows:[77] 1) the demographic growth that necessarily led to an increase in demand and 2) a more complex society linked to an improvement in economic status that enlarged the number of the élite that was spread both in urban and rural worlds. However, both these explanations must recognise a previous phase that permitted such a development.

For example, Stella Patitucci-Uggeri in her introduction to the proceedings of the fifth *Congresso di Archeologia Medievale* in 2001, stressed the importance of the Carolingians in this transition.[78] The role of the Carolingians in promoting ceramic production and distribution, however, needs more careful consideration. In general, this explanation could have some solid bases, given the fact that in that period the political and social structures seem to be more organised and coordinated by the Carolingian rulers, but this assertion needs more proof. On the one hand, it is undeniable that from the ninth century, under the Carolingian domination of northern Italy, a progressive reorganisation of production and distribution patterns seems to have taken place. In part, the material evidence could attest this theoretical reorganisation: the presence of finer pottery, even with a local variability, the spread in certain areas of glazed materials and a wider distribution sustained by new commercial relationships on river routes are, effectively, the general characteristics starting from the central decades of the ninth century. However, Patitucci-Uggeri herself did not recognise a "Carolingian type" of pottery, a problem that also more recent analyses and studies have not yet solved.[79] The lack of a Carolingian type complicates the definition of the Carolingian role itself in this ceramic and economic development. The only thing that could be correctly asserted is that certainly

[76] See Fig. 2 for the specific sites and Rottoli, 'Reflections': 20-27. In particular a good example for this case could be Nogara, F. Saggioro *et al*., 'Alcuni dati e considerazioni sull'insediamento d'età medievale nel veronese. Il caso di Nogara (secoli IX-XIII)', in *ArchMed* 27 (2001): 465-495.
[77] Cantini, 'Produzioni ceramiche': 363.
[78] Patitucci-Uggeri: 'Introduzione': 9.
[79] Cantini, 'Produzioni ceramiche': 361-363.

something happened in the ninth century that permitted the later socio-economic growth from the end of the ninth and during the tenth century. Nevertheless, according to the available evidence this was more a feeble spark that took several years before accustoming to a new reality rather than a socio-economic revolution led by the new Frankish rulers. The tangible role of the Carolingians in this process, in fact, must be found in other fields – if evident – not in the ceramic one.

A final consideration regarding ceramic patterns is focused on the reasons why such an apparent lack of material evidence seems to appear simultaneously with the affirmation of the Carolingian dynasty in northern Italy. It is important to consider different explanations that have been made for this evident change in terms of pottery production and distribution. The relative material abundance in the chronological phases before the end of the eighth and after the beginning of the ninth century is clearly opposed to the lack of evidence in the period in which the Carolingian presence in Italy was stronger. Traditionally, in early archaeological research on the Carolingian period, these decades were characterised by an involution. This involution reached different fields like pottery – as previously described – or coin production – especially in Italy, as mentioned above –, as well as buildings and settlements patterns. This aspect regards not just northern Italy and the Po valley but, in general, the whole of Europe, in which the new Frankish dynasty did not seem to produce a conspicuous and identifiable material evidence, especially in the rural areas.[80] Of course this view has been deeply changed throughout the last 40 years of research,[81] but it is true that for the ceramic evidence the available materials are still quite limited and difficult to recognise.

The most probable hypothesis in order to explain this lack of evidence could be seen in the replacement of these materials with more perishable ones such as wood and textile fabric, like baskets, barrels or simple bags. These materials, however, left very few archaeological traces, but – according to the recent archaeobotanical data mentioned in Chapter 1 – it is possible to see an increase in northern Italy of certain types of wood and herbs, such as willow (*salix*), vine (*vitis*), hazel (*corylus*), oak (*quercus*) and birch (*betula*), that could have been useful for the realisation of baskets and other containers.[82] In fact, early medieval baskets in these materials linked to fisheries have been found in different areas of Europe like, for example, in the Flanders, Britain and Moravia.[83] Therefore, it is possible to confirm the presence of early

[80] Traditionally, the *Pirennian* view of a decline in the material evidence has been strongly argued in Hodges, *Dark Age Economics*: 6-28.

[81] For a revaluation especially for Italy see Christie, *From Constantine to Charlemagne*: 15-21.

[82] Mercuri *et al*., 'A marine/terrestrial integration': 353-372. See also the recent analyses for the territory of Nonantola, confirming this trend: A. Alberti *et al*., 'La vita quotidiana dei monaci', in Gelichi *et al.* (eds.), *Nonantola 6*: 266-270.

[83] See Chapter 4.2.3. For now, on fishing baskets: W.A. van Es – W.J.H. Verwers (eds.), *Excavations at Dorestad 3* (Amersfoort 2009): 243; C.R. Salisbury, 'Primitive British fish-weirs', in G.L. Good et al. (eds.),

medieval wooden containers, even if in early medieval northern Italy their presence still remains sporadic. In fact, the main testimonies of wooden containers are hypothetical barrels in Comacchio area and a mention of fish traps in a royal diploma of 860.[84] In addition, oak and hazel have been identified as the wood for the realisation of a plaited basket in the early medieval village of Pfettrach in Bavaria, confirming the use of wooden containers probably for transport purposes on short distances.[85] Nevertheless, even if the use of these perishable containers could be demonstrated in the future perhaps focusing on existing sites like Nonantola or Sant'Agata and a re-examination of existing materials, the question as to why ceramic seems to disappear for 40/50 years in the first half of the ninth century is still open and cannot have a precise answer. It could be asserted that, considering the presence of a local provision of resources and circuits of exchange, the production and use of large and heavy containers like amphorae – optimal for longer travels and for preserving their content – do not fit with the needs of the time, which was more incline to prefer cheaper and simpler productions like baskets or bags, but these remain just suggestive hypotheses.[86]

In conclusion, even if the picture for ceramic evidence in Carolingian northern Italy is far from completely analysed in terms of precise circulation and distribution among the Po valley centres, the presence of local and interregional exchange is undoubtedly attesting to how the river basin could have been a fundamental route for these movements. How conscious and planned by the rulers of northern Italy these networks were is still archaeologically unknown. The written sources as well tend to present a one-sided ecclesiastical point of view not allowing a deeper analysis from the rulers' perspective. The only perception available obliges us to start a bottom-up analysis looking at the singular realities and local circulations offering, however, an incomplete perspective on the socio-economic trends linked to ceramic evidence. However, some attempts in recognising other activities and management of the rivers can be formulated, allowing a more comprehensive picture to be presented.

Waterfront Archaeology (York 1991): 76-87; R. Turner, 'Fish weirs and fish traps', in A. Davidson (ed.), *The Coastal Archaeology of Wales* (York 2000): 95-108; A. O'Sullivan, 'Place, memory and identity among estuarine fishing communities: interpreting the archaeology of early medieval fish weirs', *World Archaeology* 35/3 (2003): 449-468; M. Mazuch, 'Fischereigerät aus Mikulčice und die Frage des Fischanteils an der Ernährung der Bewohner des Burgwalls', in L. Poláček (ed.)., *Studien zum Burgwall von Mikulčice V* (Brno 2003): 355-399; L. Poláček – O. Marek, 'Grundlagen der Topographie des Burgwalls von Mikulčice. Die Grabungsflächen 1954–1992', in L. Poláček (ed.), *Studien zum Burgwall von Mikulčice VII* (Brno 2005): 9-358.

[84] For wooden finds in Comacchio see M. McCormick, 'Comparing and connecting': 477-502. For the written sources, there is a mention in a diploma of 860 by Louis II of *crates* (wicker traps) placed in the Mincio river, DD L II, 31: 131; see also Squatriti, *Water and society*: 118.

[85] B. Engelhardt *et al*., 'Early Medieval wells from Pfettrach, Bavaria: cultural ecology of an early Bavarian village', *Archeologia Polona* 37 (1999): 87-118.

[86] On the variety of products see Chapter 1 and Rottoli, 'Reflections': 20-27.

4.2. *Usus aquarum* and the 'other' economy of rivers

Usually in the collective imaginary, when socio-economic networks are mentioned the direct association made by our mind is with trade and markets. Looking at Tab. 5, in the sources of the eighth and long ninth century the mention of *negotiatiores* and *negotiantes* active in northern Italy could be circumscribed in specific areas, especially in present-day Lombardy. Their presence was regulated in Aistulf's laws that establish their enrolment in the army according to their wealth.[87] Apparently loosing this juridical status in the Carolingian period, *negotiatores* were still recognised as workers in the Po valley in the ninth century in the major cities like Pavia, Milan, Cremona and Ravenna. Some of them – like Simplicianus, a merchant of Milan – are recorded as land owners, indicating a durable presence in the territory, perhaps in continuity with the Lombard period, and recognising different groups of merchants not necessarily associated with a peripatetic life – a characteristic often attributed to ancient merchants – but, instead, operating on a fixed territorial base.[88]

In addition, the spread of urban and rural markets – beginning in the eighth and increasing in the later centuries as reported in the documents – evidences how these *negotiatores* could have circulated following both local and interregional networks. Moreover, the regulation of markets in both Lombard and Carolingian laws, their mentions in royal donations and their location especially on fiscal properties along the major communication routes should also suggest a particular interest in the management of socio-economic and political control of the Po valley by the sovereigns.[89]

Certainly, markets, merchants, local and long-distance trading were important patterns, highlighted by the historiography and with explicit mentions in early medieval documents. Nevertheless, more often eighth- and ninth-century private and royal texts focus their attention on different uses linked to the river that could have also played a crucial part in those trade networks. These aspects need deeper investigation, considering the limited impact they have had on historical and archaeological debate in northern Italy.

This section of the chapter refers to a common formula of some early medieval documents: the *usus aquarum*. This formula started to appear in both royal and private charters from the late seventh-early eighth centuries, especially in donations and concessions (see Tab. 6). The phrase refers to the legal ownership of specific waters or rivers as the later ninth-century

[87] *Ahistulfi leges*, in *Le Leggi*, 2,3. Perhaps the *negotiatiores'* call to arms in Lombard society could explain why in the Capitulary of Liutprand the merchants from Comacchio are named as *milites*.
[88] See Tab. 5 and Fig. 19.
[89] On the market in the kingdom of Italy see the recent F. Rapone, *Il mercato nel regno d'Italia (VIII-metà dell'XI secolo): archeologia e storia*, PhD Thesis (EHESS Paris – University Ca' Foscari Venezia 2011).

formula, *usus fluminibus*, shows. However, this formula differed from other water rights like the *ripaticum*, and the other taxations linked to inland navigation like the *palifictura* – literally the right to install mooring poles along the shore – which were often listed separately in the concessions. The *usus aquarum* should also be distinct from the property of water itself, considering that rivers or minor watercourses were also conceded and directly named among the concessions or in more generic terms like *aquis aquarumque decursibus*.[90]

Initial studies on the *usus aquarum* and the *formulae* in the documents referring to water management in northern Italy were made by Bruno Andreolli. Encouraged by Fumagalli's works on water management and land clearance, Andreolli in his earliest studies focused his attention on the separation between the *usus aquarum* and the other *formulae*, hypothesising a different significance according to the concession that referred to a different practice in the landscape.[91] The theme was reconsidered in Paolo Squatriti's works on early medieval water, who pointed out that the appearance of these terminologies coincided with the rise of a stronger 'patrimonialisation' policy of water that started in the late sixth century and rapidly increased throughout the early middle ages. By the tenth century different nuclei of power had developed with exclusive control over specific watercourses or river sections.[92] This process had evolved during the eighth and ninth centuries as suggested by increasing references in the documents, with particular emphasis during the Carolingian period also in private charters.

Therefore, focusing on the eighth and ninth century cases, the mention of *usus aquarum* and *fluminibus* in the documents – which is however far more reduced compared to the central and later middle ages – implies the presence of a socio-political and economic organisation over internal water, even if its structure is not always clearly recognisable. According to Roman law, the uses of water regulated with specific legislation were linked to the canalisation and the maintenance of ditches for agricultural purposes. Direct water provision was, at that time, public and free for all cultivators.[93] From the Lombard period however the control over water passed to the royal *fiscus* and was therefore managed by the king, who granted all permissions linked to water.

[90] I still refer to the documents named in Tab. 6.
[91] B. Andreolli, 'Formule di pertinenza e paesaggio', *Rivista di archeologia, storia, economia e costume* 5 (1977): 7-18.
[92] Squatriti, *Water and society*: 85
[93] *Ibid*.: 90.

Looking at Tab. 6, it is possible to note, however, that the documents reporting kings' concessions of water rights for beneficiaries are inferior to those in private charters. In fact, even

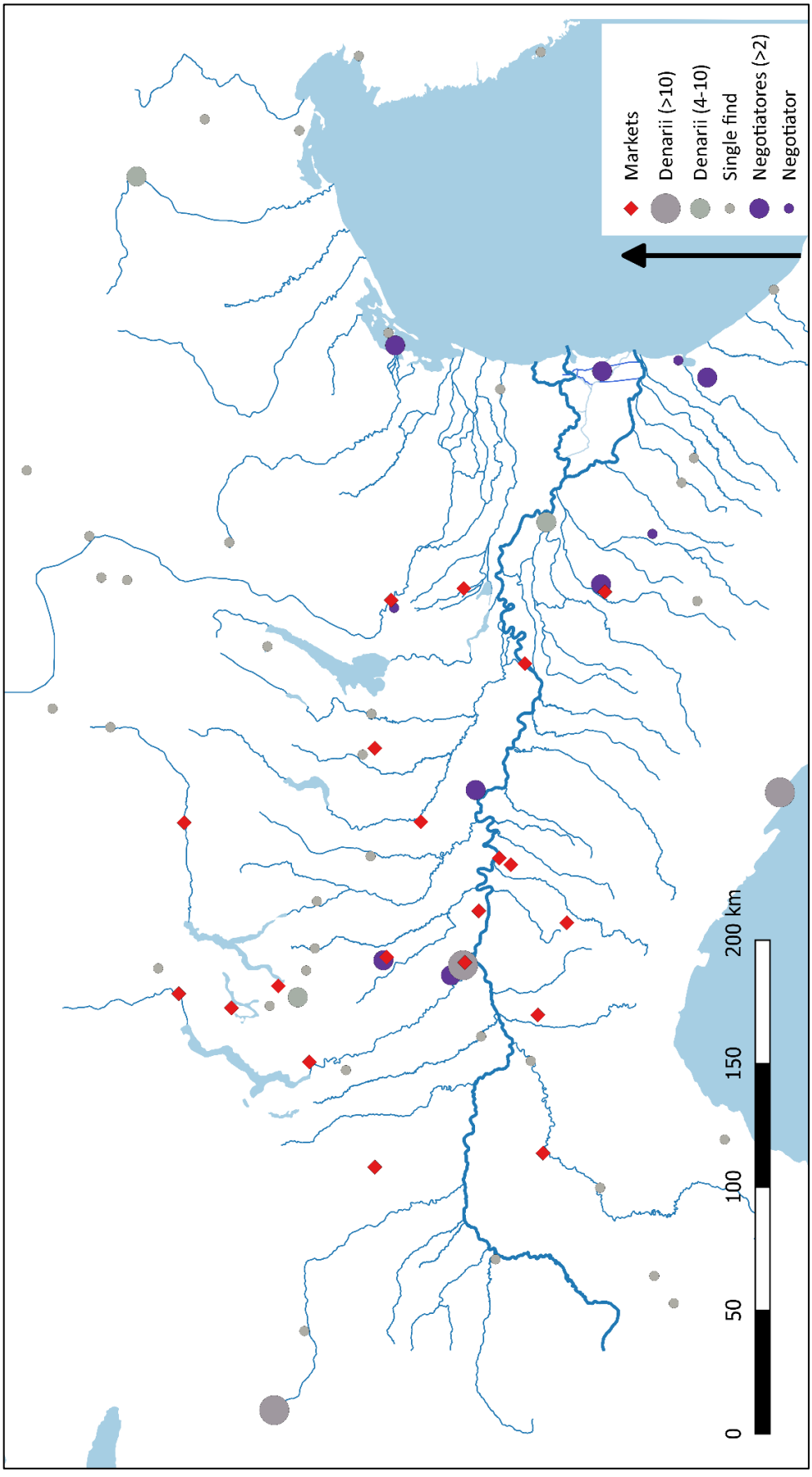


Fig. 19: Merchants, Markets and *denarii* in early medieval northern Italy

if the *usus* of water was theoretically initially exercised by the sovereign, also the granted institutions and people could concede these rights to a third party with exchanges and donations. The division of water control into multiple hands recalls the patrimonialisation process highlighted by Squatriti and depended on the differing needs of the new and the previous owners.

As highlighted in the historiography, kings were conceding water rights and uses probably in order to extend their network of alliances and control over the territory.[94] Subsequently ecclesiastical and secular lords were organising their property conferring upon local trustworthy men large portions of the territory associated with the use of water, which – as discussed in the previous chapters – was considered a fundamental element of the landscape and, therefore, of the socio-economic and political life of the early medieval Po valley. An example in this sense could be the case of Peredeus a priest close to the church of Piacenza that was managing a large portion of the territory in the pre-Apennine hills and valleys including mills and waters, possibly working in strict contact with the bishop as his agent in the countryside.[95]

Control of rivers and water patrimonialisation seem, therefore, to have involved different types of people and bodies, not limited to royals and major ecclesiastical institutions, mainly in the countryside, even if some urban cases are also recorded.[96] Michele Campopiano, in very recent articles dealing with water management in the Po valley, stressed the formation of these new centres of power in the countryside since the Carolingian period that in later centuries allowed the development of a new organisation between cities and rural communities.[97] Also François Menant, before Campopiano, in his study of the Lombard countryside and the use of water in irrigation and land clearance from the tenth century onwards, stressed the division and organisation of the countryside and waters according to new powers that had their centres in the cities but extended their control over the nearby territory.[98] In the late eighth- but more consistently in the ninth-century documents, in fact, it is possible to observe the agglomeration of these territorial centres based also on the control of water resources that could have been a possible archetypal model for those later developments.

Water management and control in the documents is often associated with different types of socio-economic activity. Surely very important – already highlighted in Chapter 2 – is

[94] Lorè, 'Monasteri, re e duchi': 947-85. For a general overview on royal policy in early medieval Europe see the volume Lorè *et al*. (eds.), *Acquérir, prélever, contrôler*.
[95] For Peredeus see later in section 4.2.1.
[96] In particular, Santa Giulia of Brescia obtained the control over the stream passing into the city, see below note 139.
[97] Campopiano, 'The evolution of landscape': 313-326. Id., 'Rural communities, land clearance and water management in the Po Valley in the central and late Middle Ages', *Journal of Medieval History* 39/4 (2013): 377-393.
[98] F. Menant, *Campagnes lombardes du Moyen Âge. L'économie et la société rurales dans la région de Bergame, de Crémone et de Brescia du Xe au XIIIe siècle* (Rome 1993).

the communication route: the river was one of the principal routes for transport and movements along with the road system. The kings' concessions of free circulation along the principal watercourses and tax collection in the principal inland ports for specific ecclesiastical institutions show how rivers were regularly used by early medieval people in the Po valley. However, the *usus aquarum* of the texts was not necessarily and primarily referring to this kind of activity.

A second important use linked to the concession of water rights was irrigation and water application in agriculture that also has been partially analysed above in Chapter 3.2. However, even if *fossae* are mentioned in the texts and in some cases archaeological surveys helped in recognising early medieval agricultural division of fields, like in the territory of Nonantola, for the eighth and ninth centuries – as highlighted since the studies of Vito Fumagalli – the sources cannot provide detailed overviews of the agricultural applications and uses of water.[99] Nevertheless, the lack of extensive analyses – especially from an archaeological point of view, the documents being not very specific in this sense – does not allow further investigations, and is limited to what has already been stressed: even if wood and water were the principal element of the early medieval environment in the Po valley, this does not preclude the hypothesis that the Po valley landscape was consciously managed by local communities, as the case studies in the previous chapter have showed.[100] This could lead to the traditionally dated eleventh- and twelfth-century colonisation of the countryside with similar uses of hydraulic resources being dated earlier in the ninth and tenth centuries, even if the purposes and socio-economic conditions were different.[101]

According to the available documentation, only two particular activities, instead, could finally allow a deeper investigation with specific examples of the *usus aquarum*. In the next two sections, the patterns of early medieval water milling and fish culture will be explained in order to understand how freshwater was managed as a resource and how its control was crucial for the development of more complex social structures based on rivers, extending the theoretical concept of amphibious culture beyond the merely characteristics of specific settlements – as van Dam initially stated – applicable to different periods and contexts, and including in its definition specific socio-economic activities that were original patterns of the early medieval Po valley riverscape.

[99] Fumagalli, *Terra e società*. For the archaeological issues see Saggioro, 'Tra terra e acqua': 206-211. For Nonantola see Librenti – Cianciosi (eds.), *Nonantola 3*: 9-11.
[100] See the examples of Sant'Agata Bolognese and Nogara explained in Chapter 3.2.
[101] On the eleventh- and twelfth-century colonisation see M. Campopiano – F. Menant, 'Agricolture irrigue: l'Italia padana', in *I paesaggi agrari d'Europa (secoli XIII-XV), Atti del XXIV Convegno Internazionale di Studi (Pistoia, 16-19 maggio 2013)* (Rome 2015): 291-322.

4.2.1. Watermills

Early medieval mills in the Po valley can be considered one of the most important landmarks that characterised the river landscape. Mills in early medieval Europe are generally associated with water and hydropower, considering that several archaeological and historical references of the period refer to watermills.[102] Watermills along the main rivers represented one of the most direct links between internal water and the economic networks that involved the entire territory crossed by the Po and its tributaries. The exchanges of mill properties and their control, along with the control of the banks of the rivers, the disputes and the frequent mentions in the written documents show how these structures where at the centre of the socio-economic life of early medieval Europe.

Publication on mills and watermills in Europe and northern Italy started in 1930s with two different essays by Lewis Mumford and Marc Bloch.[103] The two authors attempted for the first time to retrace and describe the technological evolution of mill from the antiquity through the middle ages and modern era. The two authors agreed in referring to the middle ages as the crucial period in which mills – particularly watermills in the earlier centuries – started to spread all over Europe, influencing the later technological development that brought to the Industrial revolution. This concept was reprised some years later by Eleanora Carus-Wilson in her article, *An Industrial Revolution of the Thirteenth Century*, published in the first issues of the 'new' journal *Economic History Review*.[104] These first works concerning the evolution and the impact of mill technology and its distinctive medieval origin, influenced several studies in the following decades, encouraging the re-evaluation of the negative concept of the '*Dark Ages*', in the light of a new technological tendency applied by scholars to several aspects of the socio-economic life of the middle ages.[105]

For the early medieval period, important studies on mills and especially watermills were published in the 1980s – encouraged also by the first archaeological reports – focusing mainly on central and northern Europe, but vertically increased during the 1990s.[106] In Italy, the study

[102] For general overviews see P. Squatriti (ed.), *Working with water in medieval Europe. Technology and Resource-Use* (Leiden-Boston-Köln 2000): 217-265; Id., *Water and Society*: 126-159; P. Galetti – P. Racine (eds.), *I mulini nell'Europa medievale* (Bologna 2003); P. Galetti, 'Acque e mulini tra Età Medievale e Moderna', in Galetti – Andreolli (eds.), *Mulini*: 17-26; P. Galetti, 'La forza delle acque: i mulini nell'Italia medievale', *Riparia* 0 (2014): 99-123.

[103] L. Mumford, *Technics and Civilisation* (New York 1934); M. Bloch, 'Avènement et conquêtes du moulin à eau', *Annales d'historie économique et sociale* 7 (1935): 136-168.

[104] E. Carus-Wilson, 'An Industrial Revolution of the Thirteenth Century', *EHR* 11 (1941): 39-60.

[105] For a detailed review of the historiographical debate on mills and their technological impact see A.R. Lucas, 'Industrial Milling in the Ancient and Medieval Worlds. A survey of the Evidence for an Industrial Revolution in Medieval Europe', *Technology and Culture* 46 (2005): 1-30.

[106] One of the first important studies was O. Wikander, 'Archaeological Evidence for Early Water-Mills, An Interim Report', *History of Technology* 10 (1985): 151-179. At the end of the 1980s important studies were those of R. Holt, *The Mills of Medieval England* (Oxford 1988), D. Lohrmann, 'Le moulin à eau dans le cadre

of early medieval milling increased immediately after these publications, and spread during the 2000s with main focus on the regional dossier of documents that evidence the widespread diffusion of watermills throughout the peninsula.[107] Research on watermills was later coordinated especially thanks to the synergic activity carried out by Paola Galetti and Pierre Racine and with the publication of *I mulini nell'Europa medievale* that represent also nowadays the starting point for new analyses.

More recently, debate between historians and archaeologists fomented new research all over early medieval Europe. New excavations and archaeological reports showed the consistent presence of watermills starting from the sixth century, confirming their frequent mention in the written documentation.[108] At this point, the study of early medieval watermills could happen in different disciplines and with different research foci, ranging from structural evidence to the privatisation of hydraulic power, economic production patterns or to the trade in building materials, for example for millstones.[109] The early medieval northern Italian context also represents an interesting example throughout which to investigate the role of mills and their link to the control of inland waters. Nevertheless, despite all this research, some specific issues complicate the picture.

Sources: limits and uses

First of all, contrarily to what emerged in the rest of Europe, in the Po valley and in the Italian peninsula in general a significant lack of archaeological evidence does not allow much investigation of the material culture of mills. In fact, in the Po valley for the early middle ages no explicit sites have been excavated with a clear reference to watermills. We are obliged to focus research on written documents and, in some cases, propose some comparisons with north and central Europe sites.

---

de l'économie rurale de la Neustrie (VIIe-IXe siècle), in H. Atsma (ed.), *La Neustrie. Les pays au nord de la Loire de 650 à 850* (Sigmaringen 1989): 367-404, and 'Travail manuel et machines hydrauliques avant l'an mil', in J. Hamesse – C. Muraille-Samaran (eds.), *Le travail au Moyen Age, Une approche interdisciplinaire* (Louvain-La-Neuve 1990): 35-47. Specifically, for the Carolingian period: E. Champion, *Moulins et meuniers carolingiens dans les polyptiques entre Loire et Rhin* (Paris 1996).

[107] For specific bibliography see Galetti, 'La forza delle acque': 103-106, notes 7, 9, 10.

[108] For the most up-to-date overview see B. Muigg *et al*., 'Dendroarchaeological evidence of early medieval water mill technology', *Journal of Archaeological Science* 93 (2018): 17-23. I must thank Bernhard Muigg for providing me with this article.

[109] In addition to the previous bibliography see M. Arnoux, 'Les moulins à eau en Europe occidentale (IXe-XIIe siècles). Aux origins d'une économie institutionelle de l'énergie hydraulique', *Settimane* 55 (2008): 693-746; for the Italian context on the themes listed above see Squatriti, *Water and Society*: 126-159; P. Galetti, 'I mulini monastici tra IX e XI secolo: tecnologia e organizzazione del lavoro e della produzione', in L. Pani Ermini (ed.), *Teoria e pratica del lavoro nel monachesimo altomedievale* (Spoleto 2015): 267-292. On the millstone trade see P. Galetti, 'Production, commercialisation et qualité de meules à main et de meules à moulin dans l'Italie médiévale': un bilan de la recherche historique et archéologique', in D. Williams – D. Peacock (eds.), *Bread for the People: the Archaeology of Mills and Milling* (Oxford 2011): 209-216.

However, few cases seem to suggest that this archaeological pattern could actually be contradicted, following a re-examination of several excavated sites. The most important example that allows some hypothetical mill structures to be identified is the already mentioned excavation in the locality of Crocetta in Sant'Agata Bolognese. The excavations conducted on the fortified village between 1994 and 1997 brought to light some milling elements, and particularly a series of millstones, attributable to the end of the ninth and the tenth century.[110] These 12 millstones have been catalogued according two different typologies: the first – corresponding to the majority of the stones' fragments – with a vertical and central mouth for the grain and a cavity on the opposite side in which an iron tool was supposed to be inserted as a fixing element in the rotation. Their dimensions are between 50 and 70 centimetres and the rotation was supposed to work with hydropower (or manpower) moving a horizontal and a vertical beam through a couple of gears. The second type, which is formed only by one exemplar, is smaller (25 centimetres) and seems to be intended for a more manual use, possibly with a long vertical pole attached to the ceiling.[111]

Even if these millstones seem to indicate the presence of a stable watermill in this site, the lack of other important structures and the difficult interpretation of the nearby watercourse complicate this particular scenario, perhaps allowing a more probable function using man or animal-power to be hypothesised.[112]

A second hypothetical mill structure has been proposed recently in the early medieval site of the abbey of San Silvestro of Nonantola. The excavation areas 12/22, close to the previously mentioned palaeochannel of the Torbido canal passing close to the early medieval building structures, brought to light wooden structures from the second half of the tenth century around three large wooden pole holes that seem to indicate the presence of a large mill as has been discovered in the cases of Fulda or San Vincenzo al Volturno.[113] Even if some fragments have been discovered in the area of the monastery that could suggest the presence of millstones, also in this case the scarce material evidence does not allow milling activity to be recognised for certain in this particular area.

---

[110] See in particular S. Gelichi – M. Librenti, 'Tracce di attività molinatoria in un villaggio del X secolo della Pianura Padana', in Andreolli – Galetti (eds.), *Mulini*: 347-358. For the excavations in Sant'Agata see above Chapter 3.2.

[111] Gelichi – Librenti, 'Tracce di attività': 347-358.

[112] Furthermore, in the excavations the presence of wooden structure on the southern banks of the settlement does not seem to indicate the presence of a watermill, they instead seem to be a stabilisation or a dock along the banks. See Librenti – Pancaldi 'Lo scavo': 88-129.

[113] S. Gelichi, 'Il monastero nel tempo', in Gelichi *et al*. (eds.), *Nonantola 6*: 398-399. I agree with Richard Hodges who has recently re-interpreted the use of San Vincenzo's wooden structures along the Volturno as a more likely a mill rather than a dock for transport along the river (the riverbed of the Volturno in this section was far too shallow to hypothesise navigability), see R. Hodges, 'In Small Things Forgotten. *Iuxta Flumen Vulturnum*. Gli Scavi lungo il fronte fluviale di San Vincenzo al Volturno', *Archeologia Medievale* 43 (2016): 417-421.

North of the Alps, on the contrary, the archaeological scenario for early medieval watermills is completely different: in recent years, several works on excavations of the last few decades were published, bringing to light the presence of different typologies of mills, both horizontal and vertical, often associated to precise geographical areas.[114] In Ireland and in parts of the UK the most common type of mill discovered is the horizontal one – often preferred in the Roman period almost everywhere in the Empire – while vertical mills seem to spread in continental Europe from the sixth century, as testified by several excavations in northern France, Flanders and Germany.[115]

In Italy, the lack of archaeological references can be partially filled through the large amount of written evidence, which find some parallelisms also with the northern archaeological examples. Important information on the structural and technological characteristics of watermills is available since the pre-Roman and Roman periods. The major difference from the middle ages is concerning the fact that in the Roman period no specific grinding methods prevailed over the others: the abundance of man and animal power that characterised the first centuries of the first millennium AD does not allowed watermill to spread widely as it happened since the sixth century onwards. Nevertheless, technological and structural descriptions were preserved as the use of hydropower, confirming that watermill was used even if was not the principal grinding method adopted.[116]

In late Roman authors, like Palladius, it is evident how the watermill was familiar in agriculture, especially in its horizontal form, as confirmed by archaeology. In his *Opus Agriculturae*, Palladius inserted the watermill ideally present on rural estates, confirming its common and widespread use.[117] The watermill – as anticipated – became even more common in later documentation: information on early medieval *molendina*, *molina*, or *aquimoli* (this last one especially in Romagna)[118] in the Po valley is available in different types of sources – like polyptychs, laws, royal and private charters – allowing different aspects of watermills and milling activity to be investigated (see Tab. 7). However, the sources available for the early medieval Po valley are still quite limited in their descriptions, allowing only quite limited investigation of watermills. For this reason, it is not always possible to formulate precise indications on the structural, legal, social and economic value of these mills, but some general premises can certainly be formulated.

[114] Selected bibliography in Muigg *et al*., 'Dendroarchaeological evidence': 17-23.
[115] For a general overview on Anglo-Saxon and Irish mill archaeological references see M. Watts, *The Archaeology of Mills and Milling* (Stroud 2002), more general and updated information is instead in Muigg *et al*., 'Dendroarchaeological evidence': 17-23.
[116] Squatriti, *Water and Society*: 126-127.
[117] Palladius, *Opus Agriculturae* I.XLI.I, 47. In general, on the application of mills in Roman world see the classic K. White, *Greek and Roman Technology* (Ithaca 1984): 55-66.
[118] Benericetti, *Le carte ravennati VIII-IX*, 28 (873 AD), 40 (891 AD), 50 (894 AD).

Firstly, the spread of watermills can be seen in every area of northern Italy and in the Po valley from Piedmont to the Friulan plain, from the Apennine to the Alpine valleys, as in the whole Italian peninsula.[119] This implies that watermills were a necessity for both rural and urban populations from the delta and coastal areas to the mountains. The presence of watermills in the sources increased substantially in the ninth century compared to previous Lombard period.[120] This aspect is undoubtedly connected to the larger amount of charters available after the Carolingian conquest of Italy. The so-called Carolingian 'cerealization' could be considered one of the reasons that led to this spread.[121] However, often the Carolingian documents refer to milling structures already present in the territory, showing that the spread of watermills cannot be classified as an original Franco-Carolingian pattern of northern Italy. On the contrary, these structures were already an important feature of the early medieval Po valley landscape.

A second general premise, evident in almost all the documents analysed, is linked to the production of watermills that seems to be mainly focused on processed cereals. Nevertheless, as seen in Chapter 1, the Po valley was characterised by the presence of several raw materials that could have needed a grinding process like chestnut, walnut, olive, hemp, flax or legumes.[122] For this reason, a wider use of watermills is not to be excluded, especially in those cases in which the specific production is not explicitly mentioned. From this point of view, more archaeobotanical studies should be carried out in the future in those sites that seem to report traces of milling activity. In fact, in central and northern Europe, excavations show evidence of seed remains – like flax or hemp – close to mill sites,[123] consolidating the interpretation of different uses and purposes for watermills rather than limiting the production to cereal flours.

A final remark here concerns the written evidence of early medieval watermills in the Po valley, namely the different types of dossiers I have analysed.[124] The examination of these collections of charters brought me to identify specific case studies for the analysis of the evolution of ownerships of watermills and milling rights in three different contexts, allowing differences and similarities to be noted. The examination of all these documents was helpful not only for the recognition of the three case studies with a respective documentary dossier, but

[119] Squatriti, *Water and Society*: 126-159. See Fig. 22.
[120] See Tab. 7 also for the periodisation. The first reliable mention of an early medieval mill in northern Italy and the Po valley is in 710: a donation made by three private persons of their portion of mills in the locality of *Torre* (*porcionem nostra de molinas quas abemus in loco que dicitur Torre*) to the monastery of Santi Pietro, Paolo and Teonisto of Treviso, transmitted in a ninth-century copy, CDL I, 14.
[121] On the Carolingian cerealization see R.C. Hoffmann, *Environmental History of Medieval Europe* (Cambridge 2014): 83.
[122] Horden – Purcell, *The Corrupting Sea*: 201-220. Particularly on chestnuts see Balzaretti, 'Chestnuts': 356-371; Squatriti, *Landscape and Change*: 169-180. On olives see B.J. Graham, *Profile of a Plant: The Olive in Early Medieval Italy, 400-900 CE*, PhD thesis (University of Michigan 2014). On seeds and legumes in the archaeobotanical analyses of northern Italian sites see Chapter 1.
[123] Muigg *et al*., 'Dendrological evidence': 24.
[124] See Tab. 7.

also in the identification of characteristics that permit a more general reconstruction of more material aspects of watermills in the Po valley. Before going deeper into the analysis of the specific cases linked to wider socio-economic impact of mill and milling activity, I want to continue, now, with these more material aspects, preserving a bottom-to-top investigative method, starting from a combination of material evidence and written samples.

Structural description

Even if the available sources do not provide many explicit descriptions of watermills, some elements can be retraced, helping in figuring out structures and buildings connected to milling activity and their uses.

The first aspect that emerged in almost all the types of sources examined is that watermills in the early medieval Po valley were an assemblage of different buildings. As evident in the 771 *cartula commutationis* between the abbess of San Salvatore of Brescia and the priest Andreas from Sirmione,[125] the formula of a mill *cum omnia edifitia sua* implies a series of structures that were linked to the production and the maintenance of a watermill, such as the miller's house, the granary, the tool's warehouse, a repair workshop for paddles and other broken or missing parts, possibly a shop/business area, the canalisation and damming structures and – of course – the mill itself. Another formula implying the presence of different buildings connected to the mill is *cum omnibus rebus* or *pertinentis*, as in the case of an 865 *placitum* in favour of the monastery of Sant'Ambrogio of Milan or in an 883 confirmation of properties for the monastery of San Silvestro of Nonantola.[126] These very general descriptions are the most common in the early middle ages, not specifying very often further details, except in very rare cases – as in the 865 Milanese case in which a wooden roof is mentioned – and in other parts of Italy and Europe.[127]

However, a couple of charters allow some details to be added to the structures used for the construction and maintenance of watermills. In the testament written by Desiderius and Senatore, two ecclesiastics, for the already mentioned monastery of Sant'Ambrogio, a mill is named along the Lambro in the so-called *vicus Blateno*,[128] for which are specified canals (*rubeas*), dams (*clusas*) and other structures (*concisa causa*). Already in the *Edictum* of Rothari, the regulation of dams along the watercourses of the kingdom is regulated, showing the importance that these structures had in the everyday socio-economic life of Lombard people.[129]

---

[125] *Santa Giulia I*, CDLM, 18.

[126] Respectively, *Placiti*, 67: «[…] *habendum Molino illo cum omni pertinentia sua iuris sui qui esset constituta in fluvio Lambro* […]; 92bis: […] *et molendinis cum omnibus rebus* […]».

[127] Galetti, 'La forza delle acque': 115.

[128] CDL, 183 (853 AD). Rossetti recognised the *vicus Blateno* as close to the present-day Sant'Alessandro parish between Cologno and Monza (MI); Balzaretti, *The Lands*: 379.

[129] *Rothari*, 149, 150, 151.

In an 861 document concerning the *venditio* of a mill in the Nure valley, in the present-day village of Cassano, the dimensions of a cistern – possibly used as a mill-pond for the control of the flow – are named: *qui abet per mensura tabulas decem et octo*.[130] Considering the unit of measures used in the Lombard period in Pavia, the surface of this cistern was around 508 square metres, an equivalent of almost two tennis courts.[131] It is certainly not a small area under direct control of the mill and the miller which implies the presence of other containment structures and banks.

A charter in the dossier of the diplomas of San Colombano of Bobbio explicitly names millers and – most importantly – carpenters (*magister carpentarius*) that were resident on the monastery estates with the specific purpose of repairing the mill – and all its parts like the cistern – when needed, probably a frequent activity considering the close location to water and, therefore, to high risk of flooding.[132]

Connected to this, a second important element, evident since the Lombard sources, concerns the precise location of watermills along the main rivers and the secondary watercourses. The Lombard laws of Rothari is clearly state and encourage the dismantling of those mills set up in forbidden areas.[133] This implies – as Squatriti noted [134]- that mills were constructed by local communities already in the seventh century, following their needs, not caring about more general legal overviews managed by Lombard – and later Carolingian – kings. On the other hand, these kings had a different perspective in which the location of mills was circumscribed in specific areas along principal and secondary watercourses, possibly favouring a better flow and water control, and of relevant importance from a socio-economic perspective.

Construction of mills in designated areas is, however, evident in the charters. Several documents report the formula *molendinum edificare* or *molendina facere*, as in the case of the documentary dossier of San Silvestro of Nonantola. The monastery in the Modenese countryside was beneficed with several estates, exemptions and permissions in the late Lombard and Carolingian period.[135] Among these gifts, the right of building watermills along the principal canals and rivers crossing the territory around Nonantola was conceded to the monastery, a

[130] *ChLat* Piacenza VI, 13. See later in this chapter for the mill of Cassano (PC).
[131] A. Mazzi, 'Questioni metrologiche lombarde', *Archivio storico lombardo* 38 (1911): 5-64.
[132] The eleventh-/twelfth-century copy shows traces of interpolation, but the authenticity of the contents does not seem compromised, see CDMB, 36: «*Magister carpentarius provideat omnes magistros de ugno et lapide, preter eos qui ad cetera officina deputati sunt, id est qui butes et bariles seu scrinia vel molendinia, casas atque muros faciunt*».
[133] *Rothari*, 149-151. For the Carolingians there are no specific capitularies regarding a regulation of milling activity, but the presence of mills in the diplomas and their donation and confirmation to other institutions allows some forms of control on them and their section along the riverbanks to be imagined (see Tab. 7 for the references).
[134] Squatriti, *Water and society*: 131.
[135] On the donation policy by the Lombard and Carolingian kings to San Silvestro of Nonantola see E. Manarini, 'Politiche regie'.

permission allowed only to the monks of San Silvestro and severely restricted in the case of everybody else.[136] An interesting pattern concerning the construction of mills in this period in the Po valley is that almost all the permissions conceded by the sovereigns came from later forged documents of the eleventh and twelfth century, as shown in Tab. 7. Even if in certain cases – like San Silvestro – the authenticity of the diplomas' content has been considered reliable,[137] the formulas related to the construction of mills cannot entirely reflect a contemporary need or socio-political plan, reflecting on the contrary later eleventh- and twelfth-century issues. Nevertheless, often the possession of properties and their mills has been confirmed by later eighth-, ninth- and tenth-century diplomas – as for the territory of Nonantola[138] – suggesting that previous structures were already held in those locations by the monasteries, even if their actual construction by the same institutions could be argued.

Despite of the present-day ideal picture of the medieval watermill that associates these buildings in pleasant places close to fresh streams and surrounded by fields of grain and other cereals, designated areas for the construction of watermills in the early medieval Po valley could reflect, instead, a completely different scenario. The general high flooding levels in this territory and period made the life of a mill particularly precarious. These difficulties may have been more common in the countryside, but early medieval documents suggest that watermills could have been located both in rural and urban centres. Watermills in proximity or inside early medieval cities in the Po valley have been reported in the charters. For example, two watermills donated in 767 to the monastery of San Salvatore of Brescia and to the abbess Anselperga by the Lombard king Desiderius were located along the stream crossing the city of Brescia, just outside the gates of Santi Faustino and Giovita. In the diploma, the king also allowed the monastery to control the stream flow when needed, conferring an important tool to the monastery in terms of influence over the urban space, considering that the *Cuniclo* was passing through the city, probably used also for supplying other activities through hydropower.[139] Even if this document does not provide evidence of the presence of watermills within the city walls, the presence of the stream crossing the city and the possibility of directly controlling the flow imply the presence of

[136] CDL III/I, 26: «[…] *ut nemo in praedictis fossis vel flumine audea molendinum edifficare absque consensu abbatis aut monachorum*; and again: […] *et ut in ipsis fluviis Moclena, Lamma seu Luduria nullus audeat facere molendina*».

[137] Manarini, 'Politiche regie': 18-19.

[138] *Ibid*.: 31.

[139] *Santa Giulia I*, CDLM, 14 (11th century copy): «[…] *donamus atque cedimus in ipso sancto cenobio molinas duas insimul molentes positas in aqua quę exit de cuniclo, qui decurrit intra suprascripta civitate Brixiana foris muros civitatis ante porta beatissimorum martirum Faustini et Iovittę sicuti ad curte nostra publica vel ad curtem ducalem pertinuit, una cum areales et platea ibi posita vel accessionem et omni pertinentia sua, inintegrum, sicuti nostrę potestati pertinuit vel ad supradictas curtes nostras fuerunt possessę eo tamen ordine, ut potestatem habeat omni in tempore pars predicti monasterii, si voluerit, ibi molinas habeat vel, si claudere voluerit ipsa aqua, que ad ipsa molina decurrit, aut quod eorum oportune fuerit faciendi absque omni plublica contradictione*».

structures upstream (and possibly also within the city) like canalisations or dams that should feed and regulate the *Cuniclo* stream.

Explicit evidence of urban mills is, instead, reported in the 753 donation to the monastery of San Silvestro of Nonantola by Ariprand, *habitator* of Cremona, and his wife who apparently were holding mills within the city and in its territory.[140] The presence of mills within the city gates and the urban fabric does not contrast with the description of early medieval urban sites proposed in the previous chapter. In fact, the presence of green and watery areas, and the higher demographic level compared to the countryside could have been an ideal environment for milling activity, favoured by a higher demand for ground grains and other products.[141]

Overall, the image of a watermill described in the early medieval documents of the Po valley is relatively complex. The documents are not very specific in terms of the measurements of buildings, workers, animals or common everyday tools, apart from rare cases, but they imply the presence of different structures that could be summarised in the terms *molendino*, *molino*, or *aquimulo*. The archaeological evidence in northern Italy – as already mentioned – does not help in recognising distinctive patterns and structures. However, some comparison could be proposed with other cases north of the Alps. One of the most interesting and detailed archaeological excavations is near Audun-le-Tiche, close to the present-day France and Luxemburg border, in the heart of the early medieval Frankish kingdom.[142]

In the 1990s some wooden structures were found north of Audun-le-Tiche – close to the river Alzette – and recognised as a permanent watermill. Later dendrochronological analyses identified the 840s as the first construction phase of the building which seems to be preserved at least until the mid-tenth century.[143] Wooden structures that have been recognised in the site were mainly referable to general structural elements of the mill: two wheel segments – linked to the structures with tenons – and 20 wheel paddles, recognised through 121 fragments spread over the entire excavation site (Fig. 20).[144] Overall, oak (*Quercus sp*.) and beech (*Fagus sylvatica*) seem to be the main types of wood used for the realisation of the mill and its structures and also for the repairs that were made to several parts of the mill until the 850s.[145] The dimension of

[140] The diploma is an eleventh-century copy as reported in CDL I, 107: «[…] *tam infra hac civitate Cremona quamque et foris per totum ipsum comitatum*».
[141] For the "rural" shape of Italian early medieval city see Chapter 3.1 and more specifically the recent Goodson, 'Garden cities', 339-355.
[142] P. Rohmer, 'Le moulin carolingien d'Audun-le-Tiche', *Archéologie nouvelle* 22 (1996): 6-8; P. Rohmer *et al*., 'Les moulins carolingiens (IXe-Xe siècles) d'Audun-le-Tiche (Moselle)', in L. Jaccottey – G. Rollier (eds.), *Archéologie des moulins hydrauliques, à traction animale et avent des origines à l'époque médiévale et modern en Europe et dans le monde méditerranéen* (Dijon 2016): 303-322; Muigg *et al*., 'Dendroarchaeological evidence': 17-23.
[143] Muigg *et al*., ''Dendroarchaeological evidence': 19.
[144] *Ibid*.: 19-20.
[145] *Ibid*.: 19-20.

the wheel have been estimated to be 1.6 metres, while paddles have a length from 16 to 34 centimetres and between 15 and 20 centimetres in width, while the thickness varies between 1.5 to 2 centimetres (Fig. 21a-b).

Overall, the excavation in Audun-le-Tiche shows a continuous use of milling structures at this site in the core of the Carolingian empire. The structures which have emerged reflect, however, only a part of the assemblage of buildings supposed in the charters. A possible explanation could be seen in the hypothetical distance that the mill structures could have had from other settled areas. This could be due again to the higher flooding risk that perhaps discouraged the construction of storehouses in which the grain and flour stock could easily be victim to water. What should be stressed with more importance is that in these excavations the materials that composed the singular elements of the mill should imply the presence of specialised carpenter – as the charters partially recognise – but also a direct availability of raw materials close to the located area. The circulation of common techniques of wheel and paddle construction is also a pattern that characterised Frankish and especially Carolingian central Europe, as has been recognised in addition to Audun-le-Tiche at other sites in Germany and

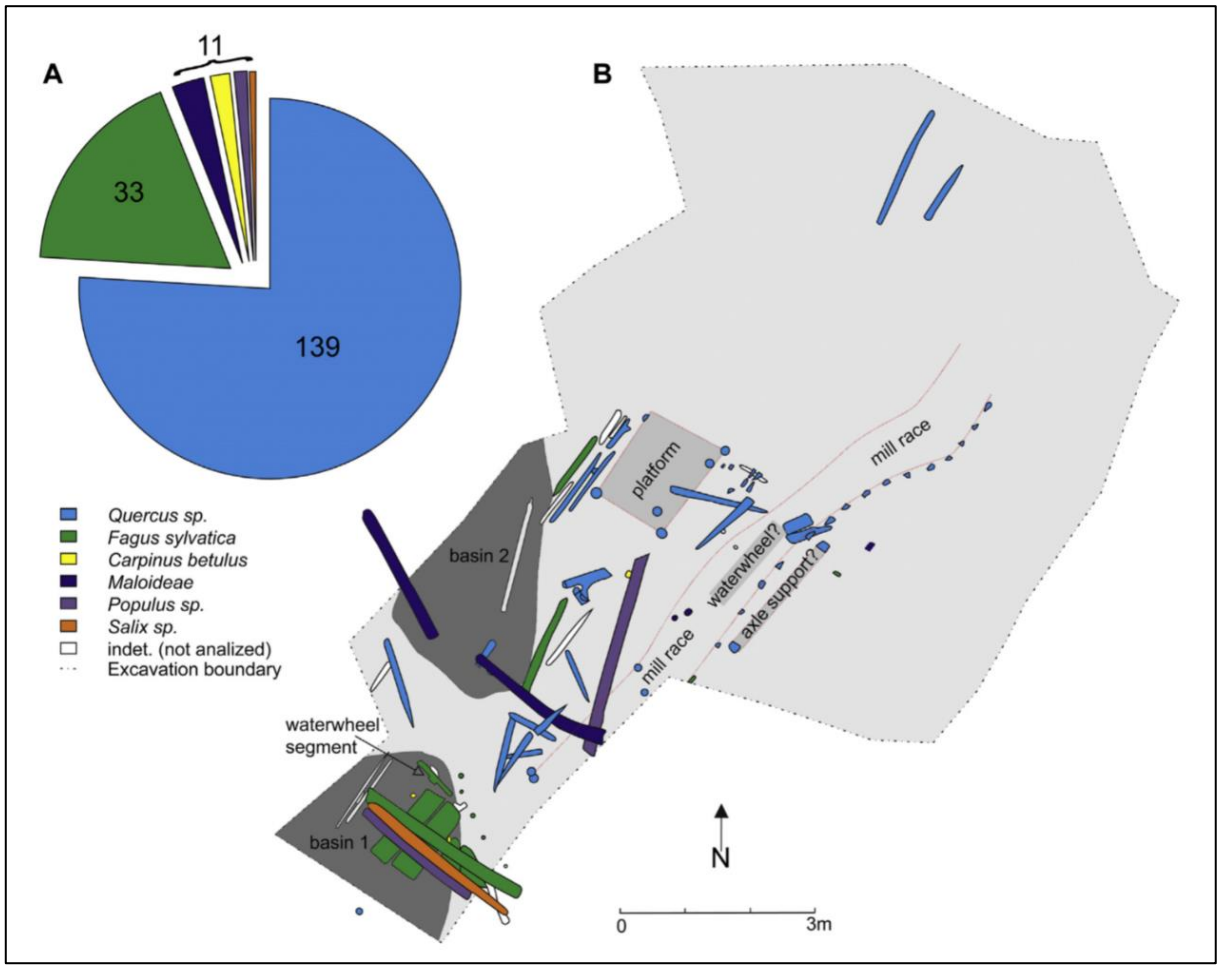


Fig. 20: Audun-la-Tiche watermill. A = wooden species. B = excavation site. From Muigg *et al.*, 'Dendroarchaeological': 20, *fig.* 2.

France like Bardowick, Belle-Eglise, Colomby, Dasing, Erftstadt-Niederberg, Fulda, Gimbsheim, Großhöbing, La Mottaz, Marillais, Thervay.[146]

Considering the rapid increase of watermills in the Carolingian period, it is odd that in the Po valley and in Italy in general there is no archaeological evidence confirming this trend. Certainly, Italian archaeological research has not focussed much effort in excavation campaigns on early medieval watermills. Therefore, it is possible that some structures have already been excavated reporting clear signs of watermills, but they were not recognised as the main purpose of those excavations, finishing unknown to the majority of the scientific community. A re-examination of available archaeological reports on sites close to watercourse should be undertaken, in order to consolidate views on early medieval watermills, adding information to the scarce evidence that we have at the moment from the sites of Crocetta, Nonantola and San Vincenzo al Volturno.

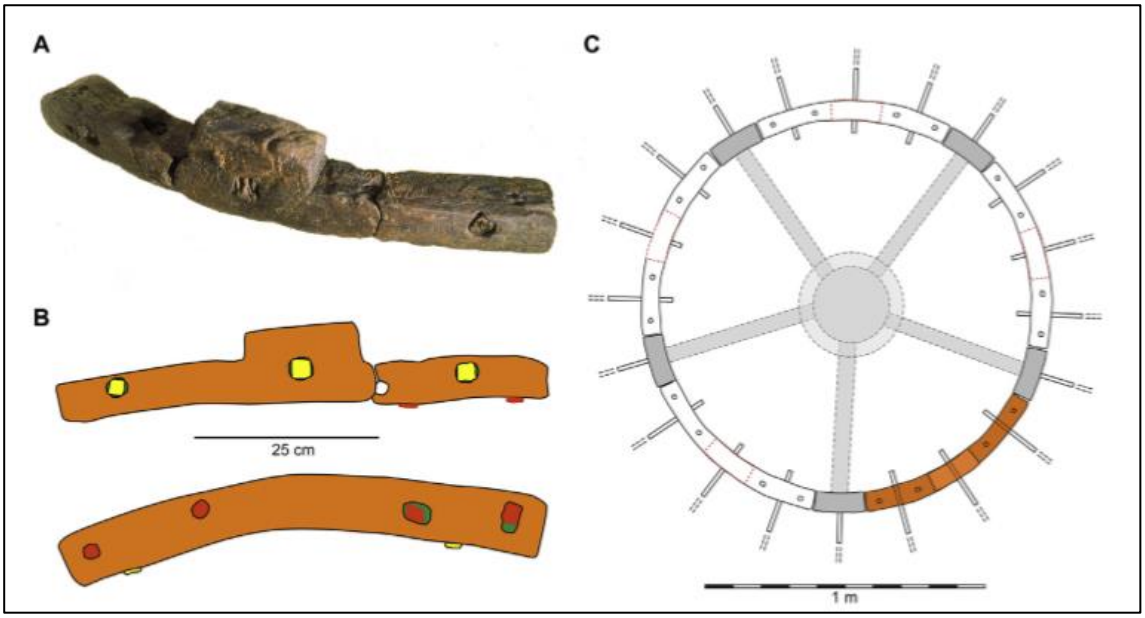


Fig. 21a: A = Wheel segment (Audun-le-Tiche). B = Graphic and technical elaboration of the segment. C= Re-elaboration of the waterwheel. From Muigg *et al.*, 'Dendrological': 23, Fig. 5.

[146] For specific bibliography see *Ibid.*: 23.

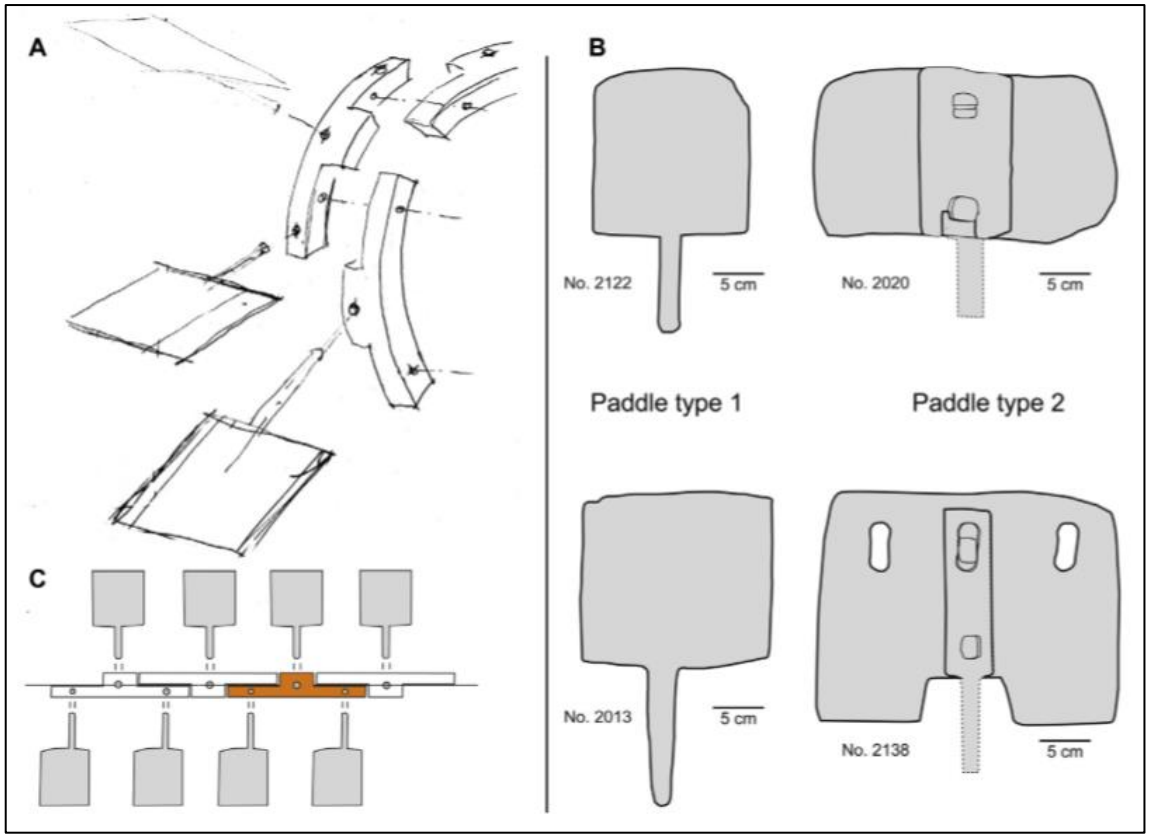


Fig. 21b: A = Waterwheel reconstruction. B = Paddle types found at Audun-la-Tiche. C= Paddles gear graphic representation. From Muigg *et al.*, 'Dendrological': 23, Fig. 6.

Socio-economic impact

The connection between mills and water in the early medieval Po valley cannot be limited to the structural elements that characterised them, as explained above. If it is true that a mill needed a constant flow in order to work, it is also true that often – as evident in the charters – the property of these structures was flanked by the control of a section of the watercourse along which the mill was located and of a series of water rights exercised by the owner(s).

Watermills, therefore, were not only a means of production generating income only from their grinding activity, but they also represented a far more complex element in the socio-economic (and possibly political) landscape. In this sense, the mention in some forged Lombard charters of *teloneis molendinorum* – probably a complementary toll to the *molitura de molendinis* exercised by the church of Cremona on its section of the Po valley between the port of Vulparolo and the confluence with the Adda until the twelfth century – is emblematic.[147] Is there a distinction between the mill toll and the mill itself? Have the owners of the mill also always the right of *molitura*?

[147] The mention of *teloneis molendinorum* is in a twelfth-century forged document referring to a donation made by the Lombard king Liutprand to the monastery of San Pietro in Ciel d'Oro in Pavia in 714, see CDL III/I, 11. For Cremona, until the tenth century, see DD L II, 1 (851 AD), 4 (852 AD); DD K III, 90 (883 AD); *Placiti*, 98 (891 AD), 119 (910 AD); CDL, 139 (841), 153 (842 AD), 170 (851 AD), 275 (878 AD), 299 (881 AD), 323 (883 AD), 349 (891 AD); all collected also in Falconi, *Le carte cremonesi*.

In order to investigate these issues, it is crucial to understand how the ownership of mills in the early medieval Po valley worked, always keeping in mind the difficulties of delineating a clear picture on these aspects due to a lack of documents and studies. In doing so, I isolated three different case studies in different areas of the Po valley with the purpose of verifying which patterns were shared and which ones differed. As explained above, these three cases have been identified because of the major availability of documents relative to the dossiers of three different institutions: Sant'Ambrogio in Milan, San Salvatore/Santa Giulia in Brescia and the church of Piacenza.[148] In these dossiers it has been possible to identify the records of three watermills and to retrace also their following developments and changes in ownership, an operation almost impossible for other areas and institutions in the Po valley and northern Italy, due – again – to the lack of documentary sources.

The first case I want to put in the spotlight is not referring to a single mill, but to a series of milling structures in the area of Cologno Monzese, east of Milan, along the river Lambro. This area has been recently analysed by Ross Balzaretti in his book on the monastery of Sant'Ambrogio in Milan, but previously, instead, it was analysed in detail by Gabriella Rossetti and in part by Cinzio Violante.[149] For these authors, watermills played a crucial role in the expansion policy of Sant'Ambrogio, making Cologno one of the best cases for the study of the socio-economic impact that these structures had on society, the river and economic systems.

Between the 850s and the 870s, a series of properties started to be traded by the monks of Sant'Ambrogio in the area of Cologno.[150] In almost all these properties a mill is mentioned, located along the Lambro. In 861 a mill was bought by the abbot of Sant'Ambrogio, Peter, at the price of 40 solidi, which in 863 was transferred to the monastery itself and reconfirmed in 865. The most interesting aspects are evident in the 865 *placitum*, held by the count of Milan, Albericus.[151] The *placitum* confirms the rights and the properties of Sant'Ambrogio, represented by the abbot Peter and the advocate Jordan, in Cologno after some 'usurpations' by a local lord, Walpertus, who seems to have used and taken control over the lands of the monastery. A large section of the document is about the mill previously sold by the same Walpertus – and Guido, a relative – to Peter, the abbot, for 40 solidi and that, already 20 years earlier, became a possession of Sant'Ambrogio after an exchange between Teopado, priest of Sant'Ambrogio, and

[148] For Sant'Ambrogio see A. Fumagalli, *Codice diplomatico santambrosiano* (Milan 1805, reprint in 1971). For San Salvatore/Santa Giulia the recent online edition of the *Codice diplomatico della Lombardia medievale* (CDLM) by Ezio Barbieri, Irene Rapisarda and Gianmarco Cossandi. Piacenza has the richest dossier of document for the eighth and ninth century, in this case I used the edition in the *ChLat*.
[149] Balzaretti, *The Lands*: 345-392; G. Rossetti, *Società e istituzioni nel contado lombardo durante il medioevo. Cologno Monzese, I (secoli VIII-X)* (Milan 1968); Violante, *La società milanese*.
[150] For a complete list of references see Balzaretti, *The Lands*: 499 (table 26).
[151] CDL, 234.

John, his brother.[152] The description of the mill is quite accurate – as saw above in the chapter – mentioning materials (*lignamen* for the roof), structures (*ordinacionem*) and correlated properties (*insolas*, *camporas*, *pratas cum arboribus*). In the text, however, a distinction seems to be made between the ownership of the mill, its structure and material belongings and the *portione sua*.[153] This distinction is very curious and not very explicit in the majority of the documents reporting information on mills in the eighth- and long ninth-century Po valley. The intensifier *tam*, in Latin, seems to mark this distinction allowing two different meanings to be proposed for the two types of ownership: from one side, the ownership of the mill itself, its land and belongings, that in this case were of the Sant'Ambrogio; from the other, the ownership held with the *portione*, possibly referred to the production of the mill and, therefore, its economic income (both in ground products and silver). It seems likely to me that the distinction between the two ownerships makes clear that a *portione* of the mill – in this case – should not imply the ownership over a physical part of the mill rather than over a part of its incomes.

The concentration of mills in Cologno has been explained as a way for the monastery to take control not only over important centres for the every-day production and economic life of the area, but also over a "potent symbol of lordly domination".[154] This is particularly evident in an area in which a large production of grains is available as in this case – as Balzaretti recognised. In this picture the division between the two types of ownerships could be crucial, allowing the monastery to maintain the control of the mills and their properties but consenting to the development of alliance networks and local self-organisation of the economic circuits dependent on the mill. The control of the mill as physical place, therefore, should also imply some benefits from the owner that could be seen in the social control of the area, referring to the miller not only as a local businessman but also as an agent of the mill's owner.

Even if these are only hypotheses, it is worth going further to try to understand why Sant'Ambrogio wanted such a number of mills and properties concentrated in Cologno. Two factors could have been considered in this territory that could explain the concentration of mills as a socio-economic tool for the monastery: the first is the rivalry that the monastery of Sant'Ambrogio had with local families and the church of Monza, which could imply a competition in the territory in both social and economic terms. The mills – in this sense – should play an important role stabilising the power of the monastery in a possible 'hostile' territory. The disputes between the abbot Peter and local lords like the *Leopegisi* family – as seen in the 865

[152] CDL, 139 (840 AD).
[153] CDL, 234: «*Insuper et dinasset ei per ipso subcepto launechildo proprietario nominee habendum molino illo cum omni pertinencia sua juris sui tam sua porcione quamque et de predicto Johanne germane suo qui esset constituta in fluvio Lambro quas Johannes presbiter per libello habere videbatur* […]».
[154] Balzaretti, *The Lands*: 382.

placitum – reflect this situation, in which the monastery had to face a strong resistance.[155] The second factor could be seen in the transport system linked to the Lambro and the road linking Milan with Cologno, Monza and the Alpine area with the other important centres held by the Milanese monastery.[156] Considering the proximity of the mills to the river and to bridges as evident in the cases in Cologno, a wider range of uses for these structures that were not limited to local production and distribution patterns could be hypothesised, but also as connecting structures for the interests that the monastery had along those communication routes and on the two banks of the Lambro. These patterns, however, could be a specific characteristic of this area and institution, and not even so explicit in the sources. However, it is worth comparing other cases to see how the Cologno case might have been adapted to different realities.

Moving eastward in the present-day province of Mantua, west of the Mincio river, another mill seems to share a similar importance in terms of local control by an institution. According to a charter dated to the 3rd June 765, a Lombard nobleman, Cunimond from Sirmione, donated *pro remedio anime sue* to the churches of San Martino, San Vito and San Pietro in Sirmione and San Martino in Gusnago several properties.[157] Among these properties, in his *curtis* (*curtis mea domo cultile*) in *Gosenagio* (Gusnago)[158] a mill is named. The same mill is mentioned in the later exchange of 771 between the abbess Anselperga and Andreas of Sirmione, in which it is specified the location *in fluvio Mentio* (along the Mincio).[159] In this *cartula commutationis* we acknowledge that the mill was still part of the possessions in the *curtis* of Gusnago, which extended over 285 *iugeri* and 8 *pertiche*. This *curtis* was originally constituted also by a *silva* that extended over 150 *iugeri* and was already among the properties of the monastery of San Salvatore as a previous charter of 760 reports.[160] Already at this point the scenario is very complex, but in the later developments the fate of this *curtis* and its mill does not seem to be clearer. In fact, in the later confirmations of San Salvatore/Santa Giulia this property does not appear, even if other locations in the same area are maintained or acquired – like Goito, Gummolfi, Marcaria, Campitello, Cubolas, Rivardo Mantovano, Castelluna, Gigonara

[155] *Ibid*.: 384-385.
[156] On the properties of Sant'Ambrogio and their link to the transport system see *Ibid*.: 481-526. See also the text of the *Placitum* of 865: «[…] *cum omni pertinencia et aquarumque ductibus seu accessionibus suis juris sui tam suam porcionem quamque et de germane suo Johanne* (lawer of the monastery) *usque da ponte sunderasco in qua perget via de Sundro* (Sondrio) *adversus Sertolas* (Sertole) […]».
[157] *Santa Giulia I*, CDLM, 10.
[158] For the identification of *Gosenagio* with Gusnago MN, see A. Chavarría – A. Crosato, 'Chiese rurali nel mantovano tra tardo antico e altomedioevo', in G. Andenna *et al.* (eds.), *Le origini della diocesi di Mantova e le sedi episcopali dell'Italia settentrionale (IV - XI secolo)* (Trieste 2006): 383-419.
[159] *Santa Giulia I*, CDLM, 18.
[160] *Santa Giulia I*, CDLM, 3.

and Montevado.[161] The *curtis* of Gusnago appears later in the tenth and eleventh century, firstly in the properties of the count Atto of Lecco, a trusted man of Berengar II, and later among the properties of the monastery of San Ruffino, founded in 874 by Louis II in Mulinello, and since 997 under control of the bishopric of Mantua.[162]

Summarising the vicissitudes of Gusnago and its mill, from the documents we understood that initially, this territory was largely covered by a fiscal forest and was among the first properties of the new-born monastery of San Salvatore. Few years later, Gusnago is a *caput curtis* of a certain Cunimond an aristocrat close to the entourage of queen Ansa, and the mill is set in its territory along the Mincio. After killing Manipert, a *gasindus* of the queen, in Pavia, Cunimond donated the *curtis* and other properties to the churches in the territory of Sirmione, hoping to 'contain damage' in the inevitable trial and king's judgment, and trying at the same time to maintain the usufruct. After this episode, the *curtis* and the mill were given back to San Salvatore which maintained the control until the arrival of the Carolingians. In the first years of the Carolingian control of northern Italy, Gusnago has new owners – who, we do not know – until it appears among the properties of count Atto. At this point the mill is not mentioned in the documents but Gusnago is a *vicus* that later figures among the properties at the dependences of San Ruffino and, indirectly, of the bishop of Mantua.

This case concerning mills, their ownership and socio-economic impact is completely different from the example seen in Cologno. The mill is mentioned only in the first documents limited to the Lombard period. In the later Carolingian documents, in particular in the *inventario* of Santa Giulia of the ninth and tenth century, the presence of mills in the area is confirmed and it is likely that the mill in the *curtis* of Gusnago was still there, considering the importance that the local church, San Martino, seems to maintain in the territory,[163] and the later evolution of the *curtis* to a village, as the eleventh-century documents show. The major change that happened in this territory that could have brought about the disappearance of the mill from the charters – and, therefore, its hypothetical role as an instrument for the control on the territory by its owners – could have occurred in the passage between the Lombard and Carolingian domination. In fact, if Gusnago in the Lombard period could be seen as one of the most important religious and socio-economic centres of the territory – as both the documentary references and the archaeological connection with Lombard elites shows – with the dissolution

[161] The 772 confirmation by Adelchi seems to maintain the ownership (*Santa Giulia I*, CDLM, 22), but both in 837 confirmation by Lothar I and in the polyptych (*Inventari*) of the end of the ninth-early tenth century, Gusnago does not list.

[162] For Atto of Lecco see CDL, 644 (961 AD) and 708 (975), in which Gusnago (Gossenago) is mentioned as *vicus*: see also Martinelli, 'Note sui beni fondiari'. For San Ruffino see DD L II, 88 and DD Kon II, 236 (1037 AD), see also G. Gardoni, 'Vescovi e città a Mantova dall'età carolingia al secolo XI', in G. Andenna *et al*. (eds.)., *Le origini*: 217.

[163] Chavarría – Crosato, 'Chiese rurali': 383-419.

of the district of Sirmione and the following confluence in the sphere of influence of the bishopric of Mantua, other centres emerged in the nearby areas better placed along the communication routes linked to Mantua and Cremona – like Goito or Ripalta – that could have developed a stronger link with the territory and therefore a better control. In these sites – in fact – the presence of settlements and economic activity linked to both forest and field work seems to be constant for all the Carolingian and post Carolingian periods.[164]

The last case I want to present is concerning the watermill located in Cassano (*Cassiano*) in the Nure valley in the territory of Piacenza, already mentioned above.[165] In this case, it is possible to note a slightly different trend compared to the ones observed in Gusnago and Cologno. In 861 in Mariano, a married couple, Cristina and Aloicus, donated to the archpriest Peredeus from Cassano a mill in a place called *casale Romani*, located close to Cassano along the Nure for the sum of nine *solidi* of silver.[166] The mill included all its properties, an *insula* (a piece of land in the middle of the Nure, or more likely some artificial structures designed for a better management of the mill, that could have been cultivated),[167] and the cistern (*aquario*) which has been noted above. The document reports also that the couple has previously obtained the mill from a certain Peter (*Petrone*) of Cassano, an advocate that in 859 was defending the interests of the *xenodochium* of Lanzano in a dispute in Piacenza.[168] Several years later in 878/879, the same mill in *casale Romani* is again subject of a donation. Interestingly the recipient of this donation is again Peredeus: the archpriest from Cassano received from Gumpertus, son of Peter of Cassano, half of the mill.[169]

Finally, in 895 in a *cartula venditionis*, two brothers and priests, Liusprandus and Antoninus from Piacenza, with their nephews – Arifred and Adelbert (*germani nepoti*) – gave to Liutefred, son of Radin, the third part of the properties in *fundo et loco casale* Cassano for the price of 10 pounds of silver.[170] Among these properties there were specifically: *molendines* with *aquarum* and *insula*, probably referring also to the mill in *casale Romani*, even if the use of the plural in Latin could indicate the presence of other (new?) structures. By the charter we are told that these large possessions in Cassano were owned by the father of the two priests, Ageprand,

[164] Vito Fumagalli highlighted these two sites as examples of economic activity in the Mantovano until the eleventh century: V. Fumagalli, 'Colonizzazione e insediamenti agricoli nell'Occidente altomedioevale: la Valle Padana', *Quaderni Storici* 14 (1970): 319-38.
[165] For Cassano as late ninth-century settlement and *plebs* see Musina, *Le campagne*: 186-188.
[166] *ChLat* Piacenza VI, 13.
[167] The presence of islands in the river associated to mills are evident also in the Lambro as noted in Balzaretti, *The Lands*: 373.
[168] *ChLat* Piacenza VI, 7.
[169] *ChLat* Piacenza VII, 3: «*dono ti bi suprascripto Peredeo et per presentem cartula donacionis in te confirmo presenti die habendum proprietario nomine, id est molino uno medietatem iuris meo in fondo casale Romani, medietate [...]omnem ordinacionem ad ipso molino pertinentem sicut modo esse videtur*».
[170] *ChLat* Piacenza VIII, 5.

that previously obtained them from Petrone *scavinio* (another Peter, perhaps a patronymic of this family?) – and Peredeus, the archpriest, that is referred in the text as their relative (*parente nostro*).

The story of the mill in Cassano allows us to investigate some questions that the other case studies do not explicitly raise. First, an aspect that does not directly concern the watermill and river use: we can see that in Cassano in the Nure valley there was a community of people economically active, and some of them, linked to the figure of Peredeus, were wealthy enough to maintain socio-economic control over several properties, with Cassano as possible headquarters (*caput curtis*).[171] As regards the ownership of the mill in *casale Romani*'s ownership, it is possible to see a similar evolution compared to the case in Cologno, but with different actors and on a different scale. Here, Peredeus – who is the common character in these documents – obtained several properties in the same years in which he received possession of the mill.[172] The documents that Peredeus was of Germanic origin, and his father, Peter (not really a German name, questioning the actual ethnicity of this family), was probably the ancestor of a family quite well established in this section of the Nure valley around the present-day Ponte dell'Olio.[173] Apparently, in Cassano the figure of one private man and his family seems to behave with similar intentions as the monks of Sant'Ambrogio in Cologno: acquiring a huge amount of properties in a specific territory characterised by a logistic importance along one of the most important Apennine river valleys linking the territory of Piacenza with Tuscany, and arranging these properties around a *caput curtis* provided with a mill that explicitly recurs in the charters. Even if the scales of the properties and the economic interests between Sant'Ambrogio and Peredeus with his relatives are different, they seem to behave following a similar model of organisation of their estates and imposition on the territory.

The charters concerning the mill in *casale Romani* seem also to consolidate the division between two different ownerships, as hypothesised in the case of Cologno. In fact, in 861 Peredeus obtained the ownership of the mill, its lands, waters and properties, in other words: the control of these structures. In 878/879 he received, instead, a portion of the economic income derived from the mill production. The acquisition of *casale Romani* and its mill by Peredeus, was therefore initially independent from the production of ground grains or pressed

[171] On this theme see Musina, *Le campagne*: 188, and a wider overview in N. Mancassola, *Uomini senza storia. La piccola proprietà rurale nel territorio di Piacenza dalla conquista carolingia alle invasioni ungariche (774-900)* (Spoleto 2013).
[172] Initially a priest called Rodevertus sell to Peredeus for ten solidi, five properties in Cassano: *ChLat* Piacenza VI, 1; later other properties were given by Paul, *vocatus* bishop, in the name of the church of San Tommaso in Piacenza: *ChLat* Piacenza VI, 17.
[173] *ChLat* Piacenza VI, 17.

oils. Only in a second phase did this happen, raising questions about what kind of purpose the mill might originally have had.

The examples reported above allowed the socio-economic issues linked to the ownership of the mills to be investigated. Certainly, the hypotheses suggested cannot be entirely relied upon and much more analysis on other cases needs to be done in order to see if this double meaning for mills and their ownership can be considered a consolidated pattern of early medieval Italy, or just a suggestive hypothesis.

Considering the possibility that watermills had different impacts on the territory and the river, the question that I would like to address at this point is: was the ownership of a watermill in the Po valley more a matter of production and income or could it imply more complex balances relative to the control of the territory and its water?

In order to understand this point, it is worth looking at the ninth- and tenth-century polyptychs produced by monastic institutions and their estates in the Po valley. In these documents is reported the production of ground cereals per year that the mills owed to the monasteries in their properties. For example, in the *inventario* of Santa Giulia of Brescia – at this time, the previous name of San Salvatore was replaced – 37 mills are named among different localities throughout northern Italy and the Po valley (see Tab. 7). The polyptych of Santa Giulia is, among the other *inventarii* edited by Andrea Castagnetti and Gianfranco Pasquali, the document with the highest amount of named mills, and – therefore – could represent the ideal case to be analysed in depth.

Looking at the distribution of the mills under control of the abbey of Brescia, coverage of several areas and landscapes is evident, from the southern Po plain to the alpine valley and lakes, but with a strong concentration in the plains of Mantua, Brescia and Bergamo, some of the best environments for the cultivation of cereals and other products suitable for milling.[174] If we consider the production needs, the spread of mills in these areas is easy to understand, possibly with a higher availability of grains and products to be processed. Nevertheless, the renders required for the single mills are certainly not consistent. As shown in the figure below and its table, it is possible to note an average of 14 *modia* of grain (c. 182 kilograms)[175] per year destined to the monks in Brescia. This is an odd amount of flour considering that a mill would spend less than a day of full work for achieving the production of an entire year for the

[174] See Chapter 1, but also Chapter 3.2. on rural settlements.
[175] Calculation based on Mazzi, 'Questioni metrologiche': 5-64, and A. Martini, *Manuale di metrologia* (Torino 1883).

monastery.[176] What should the miller and collaborators be supposed to do in the other 364 days of the year for the nunnery?

In addition, a second issue could be noted in those localities that are distant from Brescia. In fact, it is not clear why their mill should provide such an amount of processed grain to be transported for days before reaching the monastery. In fact, the risk of the refined product rotting during transportation is higher especially if compared to a more secure and resistant unprocessed cereal. Were these *modia* really designed for the exclusive prerogative of the urban monastery or might they have had other uses?

These aspects have been interrogated for years by both historians and archaeologists, but there is no clear evidence for a definitive answer. I agree with Gianfranco Pasquali who hypothesised that part of the surplus produced in the *curtes* of the monastery, including the *modia* of grain from the mills, could probably have been used locally in other properties in the same location or destined to the poor or local churches that had connections to the monastery.[177] What is evident to me, is the absence of daily need at Santa Giulia – and other similar institutions – for the products which 'arrived' from the mills listed in the polyptych. In this perspective, the hypothesis of a different, more socio-political and strategic role for the mills seems more logical. The monasteries could exercise a stronger influence in distant territories, putting the resources of the local mills towards local needs, and reserving the supplying of the monastic community from closer and local suppliers, as the local market, gardens (perhaps urban), farms or other estates directly cultivated by the monks and their serfs.[178]

Considerations: mills, rivers and early medieval society in northern Italy

The role of watermills in the early medieval Po valley can be seen on different levels starting from the bottom, represented by the natural environment surrounding its structures, and going up, impacting the life of local people, institutions and economic structures. Nevertheless, these levels can be identified through different types of sources which provided different perspectives. The royal charters and laws are probably the more general in their formula not providing many details and being sometimes too lacking in reporting consistent and precise information. This is the case of laws that, apart from the *Edictum* of Rothari in the seventh century, provide no other notice about milling jurisdiction, which is quite odd considering the larger amount of documents

[176] The production of flour of preindustrial watermills has been calculated between 20 and 30 kilograms per hour, E. Lo Cascio – P. Malanima, 'Mechanical Energy and Water Power in Europe. A Long Stability?', in E. Hermon (ed.), *Vers une gestion intégrée de l'eau dans l'Empire Romain* (Rome 2008): 201-208.

[177] G. Pasquali, 'I problemi dell'approvvigionamento alimentare nell'ambito del sistema curtense', *ArchMed* 8 (1981): 93-116.

[178] Considering the aristocratic origins that the majority of the monks had [M. de Jong, *In Samuel's image. Child oblation in the early medieval west* (New York-Cologne 1996)], I doubt that many of them would have been interested in agricultural work, despite the monastic rules and precepts of the time, therefore the major work should have been done by serfs or free peasants.

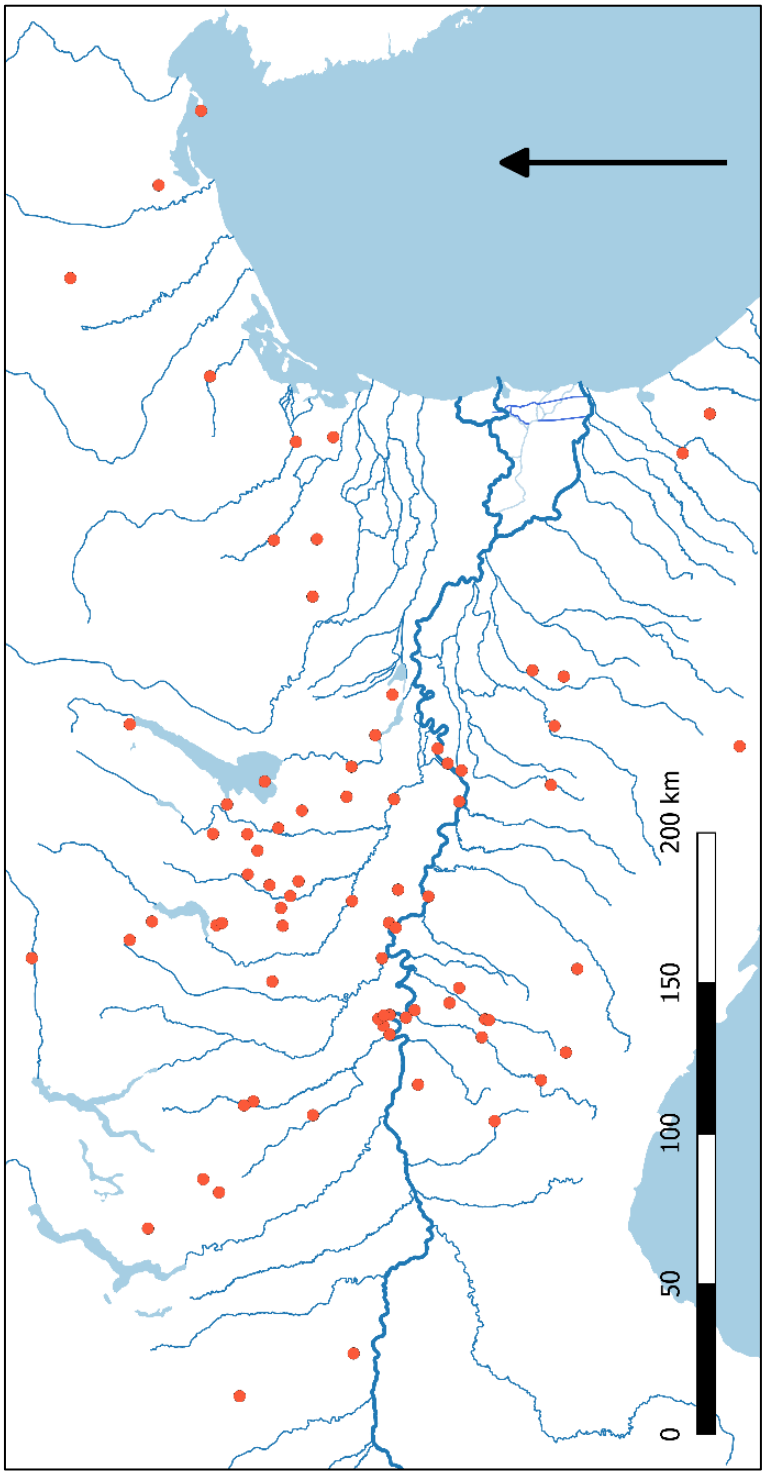


Fig. 22: Location of watermills mentioned in Tab. 7.

produced by the Carolingians and the abundance of the terms *molendinis*, *molinis* and *aquimolis* in the other types of sources. Nevertheless, in the diplomas it is implied that a sort of jurisdiction was still valid and – as in the Lombard laws – was mainly focused on the rights of constructions and their limits. These documents imply the presence of specific locations designed for 'hosting' a mill, associated also to the rights of water in that area, explicit in the document as *usus aquarum et fluminibus*. These rights not only suggest that the association between mill and river was necessary for the functioning of the everyday milling activity, but also that the owner of the mill should exercise all the other rights concerning water and its uses. Of course, in royal documents these owners were supported by the crown or could have been directly part of the royal family – as for the case of Gusnago – therefore I do not think there was no interest by kings in the matter of mills. In fact, if one of the king's problems was concerning "mills building abuse", they were certainly playing a part in the organisation of the territory and the free construction was a threat to their interests.

More specific information is available in private charters and institutional polyptychs. In these documents, the level of detail allows their position in present-day locations to be traced, the level of productivity to be understood – even if in certain cases could be complicated to understand, as in the case of the *inventarii* – or the dimensions of the structures to be estimated. What cannot be verified – unfortunately – is the impact that these mills had on the local population which ought to have represented the major outcome of a mill and the miller's daily activity. We recognise that mills played a central role in their territory also coordinating the agricultural life of the surrounding settlements. Private charters provide evidence about canals and islands, necessary artificial works for the stabilisation, formation and maintenance of watermills as also for several rural settlements as seen in Chapter 3.2. From these perspectives, watermills were central places – using an archaeological terminology – in terms of socio-economic networks and represented an additional point of contact between society and water, man and nature.

Moreover, the documents suggest their role was independent from their relationships to the ecclesiastical word. In this sense the 'clericalization' of mills outlined by Paolo Squatriti, or the primary role of monastic institutions in the management of mills needs to be recontextualised.[179] The interactions between secular and ecclesiastical powers – as in the examples in Cologno or Gusnago – or private lay people and clerics – as in the Nure valley – show that mills were not only a prerogative of a certain part of the population, but they definitely were properties to be aspired to focussing the interests of different owners from different social backgrounds and needs, implying socio-economic and political control on both land and waterscape. The division between the property of the mill structure and the property represented by the mill's income amplifies this scenario, allowing us to see traces of social alliances and the emergence of family and small group interests, as in the case of Peredeus of Cassano, not only limited to the Lombard period – as Squatriti suggested –[180] but also with similar and more local trends in the following centuries.

Overall, watermills could potentially reflect several aspects of early medieval society and economy of the Po valley. Their presence in important crossroads and central places reflects a primary importance also for understanding assessments of powers in small-scale and local areas. Their proximity to water made them the first obstacle for nature during flooding events and for this reason it is not simple to understand to what extent they could actually be central places in the surrounding landscape, even if the documents seem to suggest so. However, watermills can

[179] Squatriti, *Water and society*: 126-159. P. Galetti, 'I mulini monastici tra IX e XI secolo: tecnologia e organizzazione del lavoro e della produzione', in L. Ermini Pani (ed.), *Teoria e pratica del lavoro nel monachesimo altomedievale* (Spoleto 2015): 267-292.
[180] Squatriti, *Water and society*: 126-159.

be considered a strong sign of that amphibious culture analysed in the previous chapters, and – with their spread throughout Europe from the sixth century – seem to confirm this trend in early medieval societies.

4.2.2. Freshwater fish and fishing activity: structures and rights

The early medieval environment in the Po valley could be considered the best ecological base for a rich fishing activity on major and minor rivers, tributaries, streams, marshes and lagoons. Nevertheless, the study of freshwater fishing practices in the early medieval Po valley has been little considered in historiographical debate. The main works on this topic belong to two different periods: the first is Giuseppe Mira's *La pesca nel Medioevo*, written at the end of the 1930s, focused more on the later medieval period but starting his analysis with the Roman fishing practices.[181] The second is – instead – Paolo Squatriti's fourth chapter of his *Water and society*, written at the end of the 1990s, presenting an overall picture across the early medieval Italian peninsula, focusing in particular on the socio-economic impacts that early medieval fishing structures had on societies.[182] Between the 1930s and the 1990s, however, other works have been published focusing on specific local cases. Examples of these are two papers wrote in the 1980s on the low Emilian plain, focused the area of Gavello, San Martino Spino and Bondeno between early and late middle ages.[183]

After these initial works by medieval historians, some contributions in more recent years have been produced after the increase of archaeological discoveries and techniques. In particular, zoo-archaeologists since the 1990s started to collect organic remains in early medieval and medieval pits in representative sites – like in Monte Barro, Santa Giulia of Brescia and Nogara –[184] that allowed a deeper study of animal distribution and consumption in medieval societies. These studies have recently been discussed by Mauro Rottoli,[185] confirming the widespread consumption of freshwater fish in the Po valley as will be discussed later in the chapter. On general diet issues the contributions by historians have been continuous, especially

[181] G. Mira. *La pesca nel Medioevo* (Milan 1937).
[182] Squatriti, *Water and society*: 97-125.
[183] R. Rinaldi, 'Paludi e peschiere nella bassa pianura padana tra alto e pieno medioevo', in B. Andreolli – G. Mantovani (eds.), *Gavello e San. Martino Spino. Storia di una valle di bassa pianura* (Mantova 1993). C. Frison, 'Bondeno': 307-317.
[184] P. Baker, 'Fauna', in G.P. Brogiolo – L. Castelletti (eds.), *Archeologia a Monte Barro, I, Il grande edificio e le torri* (Lecco 1991): 153-167; Id., 'The vertebrate remains from the Longobard and 9th-10th C. occupation at S. Giulia, Brescia', in G.P. Brogiolo (ed.), *S. Giulia di Brescia, gli scavi dal 1980 al 1992* (Florence 1999): 425-449. Id., 'The animal bones from Strs. II-VII: subsidence, husbandry and status', in G.P. Brogiolo – L. Castelletti (eds.), *Archeologia a Monte Barro, II, Gli scavi 1990-1997 e le ricerche al S. Martino di Lecco* (Como-Lecco 2001): 249-268; Id., 'Assessment of animal bones excavated in 2004-2005 at Nogara', in Saggioro (ed.), *Nogara*: 107-121.
[185] Rottoli, 'Reflections': 20-27.

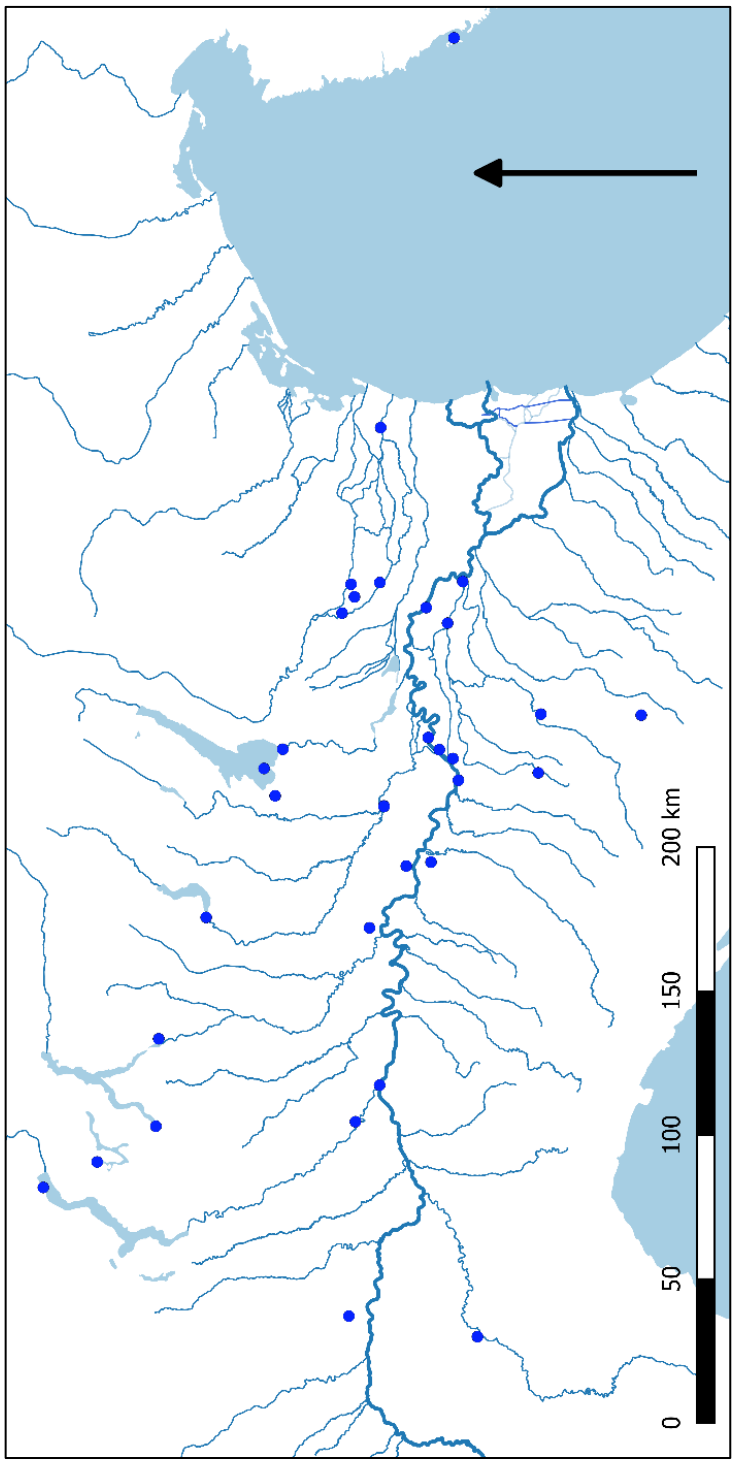


Fig. 23: Fisheries distribution according to the documents in tab. 8

since the publication of Massimo Montanari's *L'alimentazione contadina*,[186] which is also nowadays the starting point for the discussion of these topics. Fish and fishing activities, however, have remained at the margin of the analysis for the northern Italian context. The only exception that followed a major interest is the study of pottery circulation linked to maritime fish (the ancient Roman *garum*) hinterland trade, especially from northern Adriatic area to inland centres.[187]

Early medieval and medieval fish and fishing practices in a wider European context – on the contrary – is a research topic that has been deeply studied, especially in northern regions and countries like in the British Isles, Scandinavia, northern France and Flanders.[188] The

[186] Montanari, *L'alimentazione*. On fish (linked to monasteries consumption) see page 283.

[187] It has been recently submitted a doctoral thesis in biological anthropology on early medieval diet considering the Veneto area case studies that actually seems to confirm this scarce interest for the early medieval northern Italian context, see A.B. Maxwell, *Exploring variation in diet and Migration from Late Antiquity to the Early Medieval Period in the Veneto, Italy: A Biochemical Analysis*, PhD Thesis (University of South Florida 2019). On maritime fish trade see Gelichi – Negrelli, 'Anfore e commerci', and above Chapter 4.1.

[188] For the most important overviews and bibliographies see R.C. Hoffmann, 'Economic Development and Aquatic Ecosystem in Medieval Europe', *The American Historical Review* 101/3 (1996): 631-669; Id., 'A brief history of aquatic resource use in medieval Europe', *Helgoland Marine Research* 59 (2005): 22-30.

analyses have focused both on maritime and freshwater fishing areas, fisheries and fish consumption, allowing general trends to be identified that were already summarised by Richard Hoffmann between the 1990s and the 2000s.[189] These aspects, however, could allow possible comparisons with the northern Italian case that could at least help in recognising general patterns.

As also for watermills, the main difference between the Po valley (and the whole Italian peninsula) and northern European analyses is the evident lack of archaeological evidence for both fishing structures and fish remains characterising many northern Italian sites. This aspect complicates a picture that is still not clear looking only at the documentary evidence. In fact, the primary difficulty in research is the lack of proper structures in the landscape that could help to recognise how fisheries, fishponds or other fishing areas were and worked. Hypotheses of material evidence for fishponds has been recently formulated for some structures in the area of Comacchio, but the analysis is still lacking more clear elements that could confirm a material identification of fish farming (in fact, possible use as structures for salt production or other lagoon farming activity cannot be excluded).[190] This could be considered to be pioneering work on the archaeology of fisheries in northern Italy, trying to fill the gap with the northern European evidence. However, this interpretation is still hypothetical. In addition, this would represent a delta-coastal site which implies different managements and structures – considering maritime water and tides – compared to inland sites, which are the focus of this thesis.

Nevertheless, the picture which has emerged from recent research is not completely obscure. In fact, evidence of fishing activities for the early middle ages in the Po valley is in several written sources, allowing us to investigate material, legal and socio-economic aspects linked to early medieval fishing in freshwater contexts.

Evidence of freshwater fish and fishing practices

Fishing, fish farming and consumption have been regular practices in the Po valley since prehistory, but clear evidence is recognisable only in more recent times. For the Roman period, written accounts are available that could also help in reconstructing early medieval practices. Most Roman sources, however, reported more about marine than freshwater fishing. The Adriatic was often described by Latin authors as a sea rich in fish, and its products were reaching the most important cities along the coast or in the closest hinterland like Ravenna, Altino, Padua,

More recently on the Irish context, see the bibliographical overview in L. Downey – M. O'Sullivan, 'Know your Monuments: Medieval fisheries', *Archaeology Ireland* 23/3 (2009): 30-33. On medieval maritime fishing see J.H. Barrett – D.C. Orton (eds.), *Cod and Herring. The archaeology and history of medieval sea fishing* (Oxford-Philadelphia 2016).

[189] R.C. Hoffmann, 'Medieval fishing', in Squatriti (ed.), *Working with water*: 331-393.

[190] Grandi, 'Un delta in movimento': 19-20. Rucco, *Comacchio*: 36-38 and 109-114. S. Gelichi – D. Calaon, 'Comacchio: la storia di un emporio sul delta del Po', in F. Berti *et al*. (eds.), *Genti nel delta*: 387-416.

or the Istrian cities.[191] References to inland water resources for this period are, however, limited to few authors and to the delta area that – as seen in the previous chapters – cannot be entirely considered as a pure river environment.[192]

For the Roman and late antique periods, a particular pattern has been recognised distinguishing the consumption of maritime, freshwater, fresh or processed fish according to different social classes.[193] This implies the presence of multiple trade circuits associated with specific markets, from every-day consumption to luxury goods connected to fish, implying different structures of production and availability 'on market shelves' of certain species and fish products. The consumption of maritime fish, however, seems to have been the preferred one within Roman society. Even if its availability was a priority for the aristocracy, it seems that its consumption was quite widespread across the whole of society.[194] Freshwater fishing, on the contrary, is less visible in both literary and archaeological sources, but its consumption was parallel to the maritime one – if not higher – especially in those periods of the year in which the offshore catch was problematic.[195]

As far as written sources on early medieval freshwater fish are concerned, it is possible to recognise four main types: laws, royal diplomas and charters, polyptychs, and hagiographic/ecclesiastical texts. In all these sources terms like *piscaria*, *piscatio*, *pisces*, *vivaria* are often named but with different meanings and roles according to the context.

One of the principal sources used by historians in analyses of fish production and consumption are the monastic rules. Fish consumption is, in fact, implied in the life of early medieval monks in all Europe.[196] This pattern could easily be applied to northern Italy, testified also by the hagiographic texts like Jonas of Bobbio's *Vita Columbani*, in which the author often specifies the abundance of fish in the water near the monastery.[197] Nevertheless, monastic rules do not always evidence a large fish consumption. For example, in the Benedictine Rule, there is no direct mention of fish consumption or farming, while it could be implicitly supposed considering limitations on meat consumption. Paradoxically, fish consumption for monastic communities has been demonstrated in northern Italy and Europe through archaeological

[191] See Catullus, *Carmina*, 95, 7-8; Martial, *Epigrams*, 13, 88-89; Pliny the Elder, *Naturalis Historia*, 11, 169 and 32, 150; Columella, *De re rustica*, 8, 16, 8 and 8, 16; Cassiodorus, *Variae*, 12, 22, 4. For the Po delta fish abundance see Virgil, *Aeneid*, 11, 457-458: «*piscosus ammis Padusae*». See for a general overview M.S. Busana, 'Fishing, fish farming and fish processing during the Roman age in the Northern Adriatic: Literary sources and archaeological data', *Regional Studies in Marine Science* 21 (2018): 7-16.
[192] See Chapter 1 and 3.2.
[193] A. Marzano, 'Fish and Fishing in the Roman World', *Journal of Maritime Archaeology* 13/3 (2018): 437-447.
[194] *Ibid*.: 446.
[195] Horden – Purcell, *The Corrupting Sea*: 190-197. For late antique mention of freshwater fishing on Italian rivers see Cassiodorus, *Variae*, 5, 17.
[196] Montanari, *L'alimentazione*: 223.
[197] *Vita Columbani*, I, 11, 13, and particularly on Bobbio 30.

contributions, even if it seems that a consistent amount of legumes and vegetables was the main base for their diet.[198] In England, for example, isotopic analyses on burial sites have demonstrated a large consumption of fish, eggs and cheese (30% of a daily diet) followed by bread (18%) but with a stronger 40% of the daily diet based on legumes and vegetables.[199]

Explicit mention of early medieval northern Italian fisheries, fishponds or general fishing activity on freshwater – as already seen in the case of mills – is first attested in the seventh-century *Edictum* of *Rothari*, which dedicated a chapter to the punishment for those people who have stolen fish from someone else's (possibly the king's) fishing reserve.[200] Fish, fisheries and fishing rights are later often cited in the Carolingian laws. Fisheries are part of the Carolingian estate model expressed in the *Capitulare de Villis*, and – even if it is not sure how much this text was circulating in northern Italy – it shows the centrality of fish and fishing for the monarchy's estates. Chapter 21 of the *capitulare* stressed the importance of expanding previous fisheries and building new ones in the new spots that allowed such constructions. Chapter 44, instead, regulating the diet during Lent, reports the increase of fish consumption over this period. In chapter 65, the importance of fish trade and the general management of fish stocks is highlighted, implying a circulation of maritime and freshwater fish stocks in local and regional markets.[201]

The *Capitulare de Villis*, however, is not the only legal text which refers to fishing. In the *Capitulare Aquisgranense*, Charlemagne reports the duties of the good forester and steward. Among them, the care of fisheries in the royal estates are required.[202] In the collection of documents of the *Breviarium exempla*, in which different sets of landholdings are described, fisheries (*viviaria cum piscibus*) are named in the *pars dominica* of the *fiscus*.[203] For the northern Italian context, instead, *piscationibus* are named in the villa called *Caput Argeris* (Cavarzere, VE)

---

[198] On fish remains and fish in monastic diet studied through an archaeological approach in northern Italy see E. Cirelli, 'La dieta dei monaci. Cultura materiale e alimentazione nei monasteri Benedettini tra IX e X secolo', *HAM* 19 (2013): 227-240. For a wider perspective considering more example in Europe and England see J. Bond, 'Production and Consumption of Food and Drink in the Medieval Monastery', in G. Keevil *et al*. (eds.), *Monastic Archaeology* (Oxford 2001): 54-87.

[199] D. Gilchrist – B. Sloane, *Requiem: The Medieval Monastic Cemetery in Britain* (London 2005): 210. Cirelli, 'La dieta': 230.

[200] *Rothari*, 299.

[201] Capit I, IV, *Capitulare de Villis*, 21: «*Vivarios in curte nostras unusquisque iudex ubi atea fuerunt habeat, et si augeri potest, augeat: et ubi antea non fuerunt et modo esse possunt, noviter fiant*»; 44: «*De quadregesimale duae partes ad servitium nostrum venit per singulos annos, tam de leguminibus quamque et de piscator seu formatico* […]»; 65: «*Ut pisces de wiwariis nostris venundentur et alii mittantur in locum, ita ut pisces semper habeat: tamen quando nos in villas non venimus, tunc fiant venudati et Ipsos ad nostrum profectum iudices nostril conlucrare faciant*».

[202] Capit. I, IV, 77, *Capitulare Aquisgranense*, 18: «*De forestis, ut forestarii bene illas defendant, simul et custodiant bestias et pisces* […]»; 19: «*Ut vilicus bonus, sapiens et prudens in opus nostrum eligatur cum sciat rationem misso nostro reddere er servitium perficere, prout loca locata sunt,* […] *vivaria cum pisces* […]; *in forestis mansum regale, et ibi vivaria cum pisces, et hominis ibi maneant*».

[203] Capit. I, VII, 128, *Breviarium exempla as describendas res ecclesiasticas et fiscales*, 34.

in the 883 *preceptum* of Charles III for the doge of Venice as in its later confirmations.[204] Overall, laws testified a quite stable presence of fisheries, implying also a widespread fish consumption, both in Lombard and Carolingian periods in royal estates, but with a silent phase in the century between the seventh and the eighth, considering that long-lived kings like Liutprand do not seem to have legislated on these issues.

The mention of fisheries, fishing activity and fish consumption, is a constant pattern in the diplomas, allowing the reconstruction of the production and distribution sites, not only for the Po valley but for the entire Italian peninsula, Frankish Europe and neighbours. Law and monastic rules, in this case, do not seem to make a clear difference between maritime and freshwater fish and fishing structures. In combination with the information available from the diplomas allows the presence of both types of farming and the widespread presence of freshwater fisheries and fish consumption in inland territories of the Po valley to be hypothesised. As evident from the map (Fig. 23), the presence of fisheries and fishponds cannot really be located to specific areas. Nevertheless, it is possible to identify stronger clusters of fish production in two main regions: the alpine lakes and the central eastern section of the Po, in the territories of the *curtes* of Guastalla, Luzzara, Suzzara, Sermide and Bondeno. In contrast to maritime fish, the distribution and consumption of freshwater fish is, in fact, partially archaeologically demonstrated in inland sites,[205] even if – for the Italian peninsula – archaeological documentation is not so rich. Therefore, these (and other) centres, located in proximity of a major source of water and in a central position along the transport routes, could have been some of the places in which fish was farmed, caught, conserved, transported and later traded in local or urban markets.

The consumption of freshwater fish is actually confirmed – in this sense – in the *inventarii* (862 and 883) of the monastery of San Colombano of Bobbio which report that 500 trout and eels are due to the monastery each year from its fishery in Peschiera on the southern edge of the Garda lake.[206] Transport of fish should also be a serious matter, considering all the issues implied like the conservation – through smoking, drying or salting – of the products and the actual transport on both land and water itineraries.[207] For example, the *inventario* of San Colombano of Bobbio shows that the *piscaria* owned by the monastery close to the port of Mantua (perhaps the one already mentioned in present-day Peschiera del Garda, or other structures along the Mincio) should receive the right amount of salt, coming from the merchant

[204] Capit. II, XVII, 237, *Praeceptum Karoli III* and following (239, 240, 241).
[205] See note 185. On the absence of maritime fish in archaeology – apart from the amphorae used for the transport of *garum* – see Rottoli, 'Reflections': 20-27.
[206] San Colombano, *Inventarii*, 138 and 159: «*Est ibi piscaria, unde exeunt inter troctas et anguillas D*».
[207] On these techniques see Hoffmann, 'Medieval fishing': 331-393.

vessels of Comacchio, for local fish (*propter pisces*).[208] For these aspects, in general, the Carolingian polyptychs are a useful source, recognising production, distribution and consumption patterns. However, the case of San Colombano is probably the best case that shows such a circuit between the monastery, its properties and other external actors. In fact, even if information is still available in polyptychs on freshwater fish culture, like the one for the abbey of Prüm, mentions of fisheries for other institutions are quite limited.[209]

Overall, the sources analysed seem to suggest a large use and consumption of freshwater fish, a product that seems to feed both local and regional economic circuits. The archaeological evidence in the Po valley, however, is lacking a consistent database that could allow deeper investigation from a more material perspective. Nevertheless, the combination with the written evidence seems to suggest that new excavations and analyses should be done, not limiting just to few cases as representative territorial trends, but trying to understand the principal local patterns, isolating single case studies and combining them.[210] Freshwater fish and fishing were a part of the 'riverscape' in the early medieval Po valley and they could also be interpreted as symptom of economic activity, but implying also different social aspects.

Fishing tools

A first issue that emerged in the analysis of the sources is concerning practices and tools of fishing in the early medieval Po valley. The pavement mosaic of the Basilica of Santa Maria Assunta in Aquileia (Fig. 24) clearly shows at least two types of fishing methods: the classical rod and the use of nets. These methods, even if the mosaic represents maritime scenes, could actually be one of the simplest and most used also by early medieval communities along internal waters, as the picture in the manuscript of an anonymous English Gospel lectionary of the tenth-eleventh century could imply.[211] These very basic fishing methods, as simply bare hands fishing or using pikes and spears, were very likely to be used in the early medieval Po valley, as it was for many societies since prehistory to the present-day.[212]

---

[208] *Ibid*.: 159.

[209] For Prüm see I. Schwab (ed.), *Das Prümer Urbar* (Düsseldorf 1983) in which trout are named in some villas. For Prüm it is possible to highlight production and trade circuits of freshwater fish since 752 to later eleventh-century developments: as Nicolas Schroeder presented in his paper during the IMC Leeds 2019 with the title *Fish and Fisheries in Monastic and Royal Estates between the Rivers Rhine and Meuse*. For northern Italy, another monastery which could represent a good case study is Santa Giulia of Brescia with its *inventario*. Here in fact, there is explicit evidence of the use of fishing ponds and fisheries in the Iseo lake at the service of the monastery, see Santa Giulia, *Inventarii*, 75 and 80: « […] *lacus ad piscandum*».

[210] The discussion in Maxwell, *Exploring variation*, in fact, is limited to too few case studies that, especially without a complete overview of the documentary evidence, brought to too simplistic conclusions.

[211] See the figure in Hoffmann, 'Economic development': 637.

[212] For a general overview see F.N. Marzano, 'Control and Regulation of Freshwater Fisheries', in F. Gherardi *et al*. (eds.), *Biodiversity Conservation and Habitat Management I* (Oxford 2009): 337-363.

From early medieval sources in the Po valley, two principal fishing methods can be recognised: the use of nets and the placement of traps along the watercourses.

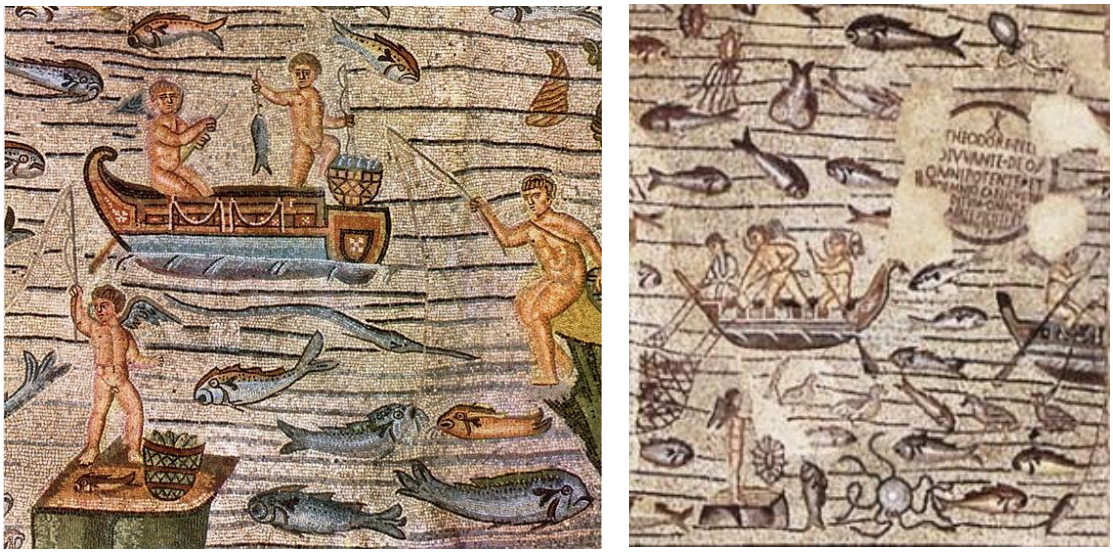


Fig. 24: Fishing scenes from the 3rd-4th century mosaic of the Basilica of Santa Maria Assunta in Aquileia. (from https://www.italianways.com/the-mosaics-in-aquileias-basilica-of-santa-maria-assunta)

Fishing nets are the most popular in the written documentation since the Roman period. For the early middle ages, a first mention – as already anticipated – is in the *Edictum* of Rothari, in which it is stressed a particular nets' care, forbidding damage to them along the rivers.[213] Nets are later named also in several Carolingian documents. For example, in an 860 diploma by Louis II confirming some privileges to the monastery of San Colombano of Bobbio, the emperor restricts the Church of Brescia to throw fishing nets (*retia trahere*) in the fishery of *Burbune* along the Mincio, reserving this right to the monastery of Bobbio and specifying that, in case of disobedience, the *preceptum* written in the *Edictum* of Rothari would have been applied.[214] Other examples of nets in written sources are available in the Italian documentation for Farfa, Rome and Lucca, implying that their use was widespread possibly both in designated locations – like fisheries – and along other watercourses.[215]

Overall, according to the legal sources cited, nets in early medieval fishing practices in the Po valley were objects of jurisdiction, and since the seventh century were protected by the crown. This should imply that nets were one of the most popular fishing methods used in royal estates, and possibly also in other similar properties owned by the king's allies like in the monastic estates.

Even if nets seem to be the most popular fishing method in the larger estates and fisheries, other practices can be detected with the same importance. The already mentioned

[213] *Rothari*, 299.
[214] DD Lo II, 31.
[215] On these examples see Squatriti, *Water and society*: 118.

860 diploma for San Colombano – for example – mentions the presence of fish traps (*crates*), placed in the fishery owned by the monastery along the Mincio. Fish traps, as nets, have been used since prehistorical times in many societies worldwide.[216] For this reason, these traps in early medieval northern Italy could have had multiple forms according to the environment, needs and ownership. The two types that according to the Mincio environments seem to be the more probable to have been used are basket traps and fishing wires. Fishing baskets could have been particularly useful in catching eels, especially in the central section of the Mincio, characterised by large wood and watery landscape, allowing the formation of large marshy areas.[217]

In general these catching techniques using baskets are also common worldwide, characterised by different shapes according to the fish.[218] Comparisons with similar baskets used more recently could be done – for example – with the case of the Venetian Lagoon (see Fig. 25), which could help in visualising hypothetical material structures.

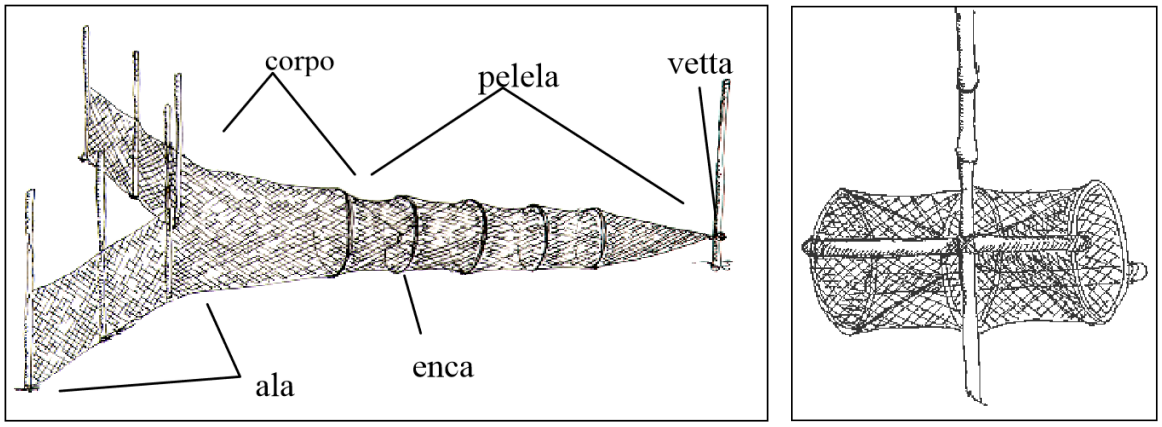


Fig. 25, Examples of fishing baskets (A = bertovello or cogollo; B = nassino o cheba), from Ardizzone *et al.*, *Management*.

Fishing weirs seem the second type of trap that could have been used in the Mincio. In fact, the Latin word *crates* meaning 'harrow' or a 'wicker pergola' in classical Latin seems to reflect such a complex structure. Considering the scarce evidence in written documents and the complete lack of archaeological materials for these structures in early medieval Italy, other examples in early medieval Europe can be used for comparisons in order to continue with the explanation. As for fishing baskets, the archaeology of fish weirs is producing several analyses

[216] See for example the case in north-western America in M.L. Moss, 'Fishing traps and weirs on the northwest coast of North America', Menotti – O'Sullivan, *The Oxford Handbook*: 323-337.
[217] On the Mincio see the example of Nogara in Chapter 3.2.
[218] Eels basket were largely used by many societies like – for example – the Maori in New Zealand, see B. Elsdon, *Fishing methods and devices of the Maori* (Wellington 1929). These practices, however, are very similar to the one common in the Venetian lagoon or in the delta area, two territories in which the consume of eel is preserved also in present-day, see G.D. Ardizzone *et al*., *Management of coastal lagoon fisheries and aquaculture in Italy* (Rome 1988). See also Chapter 4.1. note 84.

especially for prehistorical contexts in several countries and continents like North America, Australia, New Zealand and northern Europe.[219] For the medieval period, first studies conducted in Ireland identified V-shape wooden structures like in the areas of the Shannon river estuary, recently studied by Aidan O'Sullivan (Fig. 26).[220] Even if the majority of these structures has been recognised in coastal areas, medieval fish weirs in Ireland seem to be distributed also along the major rivers. The principle, however, was the same of the coastal one: trapping fish using the natural environment and the V-shape fences as obstacles in the flow.[221] These structures find no material evidence in Italy – probably because of a lack of interest in studying such structures by previous Italian scholars – but their spread in northern Europe and the adaptability to the Po valley environment, especially in its eastern section, suggests that similar arrangements could have been taken also in our cases, alongside with the other fishing methods.

In general, the presence of different tools and methods for fishing in freshwater seems to be a constant pattern in several context worldwide. Early medieval northern Italian sources, however, do not provide a full spectrum of these structures, limiting the analyses to few cases.

Fig. 26: V-Shape fish weirs in the Shannon river estuary, from O'Sullivan, 'Medieval fish': 65-77

[219] Downey – O'Sullivan, 'Medieval fisheries': 30.
[220] A. O'Sullivan, 'Medieval fish trap on the Shannon estuary, Ireland: interpreting people, place and identity in estuarine landscapes', *Journal of Wetland Archaeology* 5 (2005): 65-77.
[221] Id., 'Place, memory and identity': 449-468.

Nevertheless, the presence of different fishing methods could reflect, in this case, the presence of different structures, places and managements of fishing spots and fisheries as well. What kind of structure could have formed these fisheries? What role had fisheries in the management of fishing activity in determined areas? I will focus now on these aspects.

Structures of fisheries between Roman and late medieval periods.

The Latin terms *vivaria*, *piscaria or piscina* were used since the Roman period to indicate fishery, fishpond, or a general place in which it was possible to farm and catch fish. However, the most important fisheries according to Latin authors and to the few excavations were mostly located along the coast, implying a large presence of marine fish culture.[222] Roman agronomists – like Varro – explicitly divided freshwater *piscinae* – available for the common people – from the saltwater ones which were a prerogative of the nobles.[223] Nevertheless, the spread and consumption of freshwater fish in the hinterland should have been of great importance as well, considering the more affordable construction costs compared to the maritime ones.[224]

Roman fisheries were structured according to different schemes depending on the location. Description of fisheries from literary sources are not very common. Apart from the distinction made by Varro, another interesting source is Columella who describes fisheries (*vivaria*) placed in sandy soils as pools dug along the coast, surrounded by a series of posts and stones.[225] The structures emerging from the Roman writers are, therefore, quite simple and not so different from the structures used also in the present-day: a series of ponds probably connected to a source of water through simple canals, with a distinction in size according to the fish.

[222] Squatriti, *Water and society*: 98-103. On the cases in the northern Adriatic see Busana, 'Fishing, fish farming': 7-16.
[223] Varro, *Rerum rusticarum libri*, 3, 17.2: «*Reliqua enim fere mihi sunt nota, quod, cum piscinarum genera sint duo, dulcium et salsarum, alterum apud plebem et non sine fructu, ubi Lymphae aquam piscibus nostris villaticis ministrant; illae autem maritimae piscinae nobilium, quibus Neptunus ut aquam et piscis ministrat, magis ad oculos pertinent, quam ad vesicam, et potius marsippium domini exinaniunt, quam implent. Primum enim aedificantur magno, secundo implentur magno, tertio aluntur magno* […]»
[224] Squatriti, *Water and society*: 100.
[225] Columella, *De re rustica*, 8, 17, 9-10.

In general the main characteristics recognised through archaeology are the presence of several tools, surrounding structures for fish farming and processing, and the presence of containers for conservation and transport like amphorae.[226] As recently demonstrate by Maria Stella Busana, it is possible to recognise different structures of the same period (1st century BC) between the north-eastern Adriatic, north-western Adriatic – which is the poorest area in archaeological terms – and the Tyrrhenian sites. Busana notes a strong association between the *vivaria* of the Tyrrhenian coast and the few examples on the western Adriatic: smaller compared to the oldest ones, and directly associated with private *villae*, and characterised by circular or rectangular ponds. These structures, in fact, partially correspond to those in the site of La Scalaccia close to Ancona, in which five pools were located in two rows, carved in the stone and covered an area of 416 square meters (Fig. 27a).[227] The Istrian counterparts seem – instead – more numerous and different in forms compared to the western Adriatic and Tyrrhenian cases. Here, in fact, coastal fisheries, excavated in the stone, were characterised by two to four ponds, covering an area between 1200 to 2200 square meters. The example of Poreč, show in addition some structures not too far from the individual fishery that have been supposed to be used for the conservation of the fish.

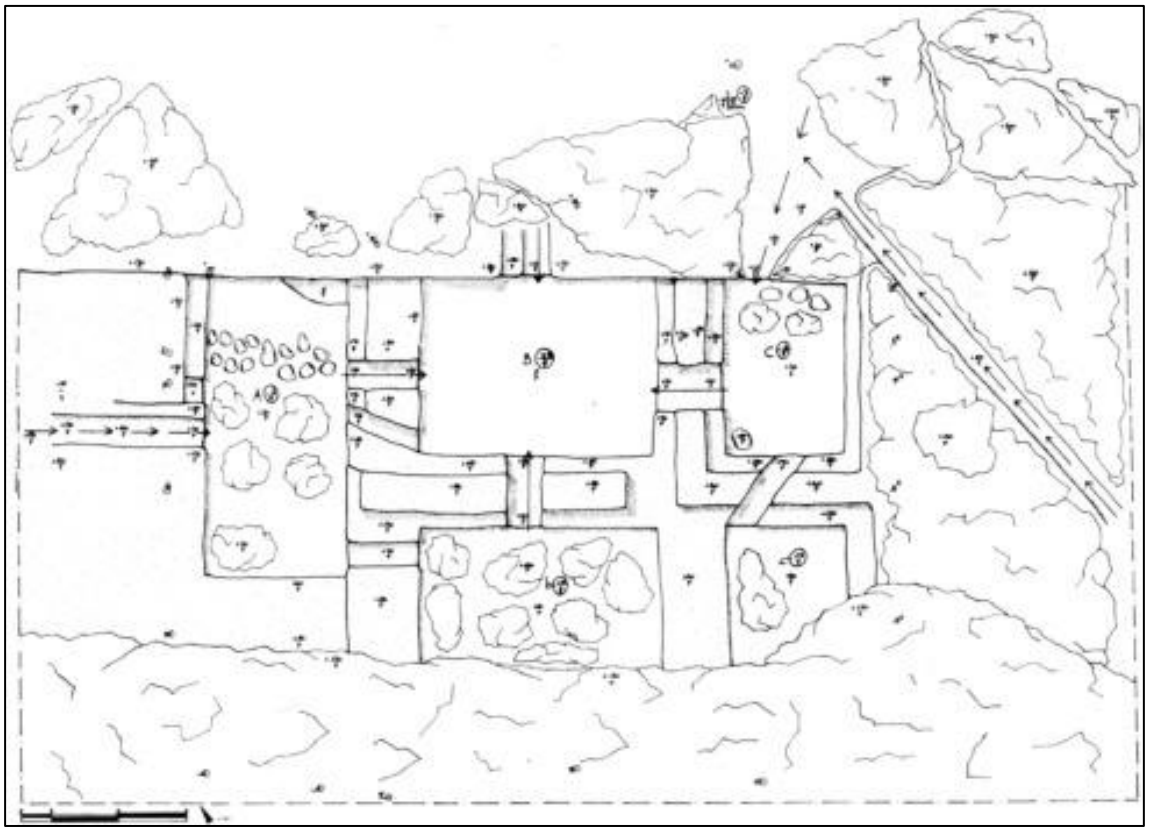


Fig 27a: La Scalaccia site (Ancona), Roman fishponds reconstruction. From Busana, 'Fishing': 10, *fig*. 4.

[226] Busana, 'Fishing, fish farming': 8.
[227] *Ibid*.: 9. These five basins, connected with canals according to Busana recall what Varro called *piscina loculata* (Varro, *Rerum rusticarum libri*, 3, 17.4) were fish was separated according to species and age.

Fig. 27b: Structures for salting and coastal ponds in Poreč. From Busana, 'Fishing': 13, *fig.* 10.

These differences have been explained as consequence of a different role for these centres. The Tyrrhenian and La Scalaccia sites, for example, have been described as private fisheries, linked to the nearby *villae*, while the sites like Poreč imply a function more to do with exchange, supported by local and regional transports and trade.[228]

In the early middle ages, these typologies and structures does not seem to be too different even for inland fisheries. If we look at the example in Poreč, the presence of both fish farming and conservation practices showed by different ponds and pools can find a parallelism in written evidence for the early medieval fishery owned by San Colombano of Bobbio along the Mincio, as noted above. Here, in fact, it seems that a distinction between farming and processing/conservation areas seems evident from the *inventario*.

Furthermore, other north-European late medieval examples like the monastic fisheries in Maubuisson in France or in Glastonbury in England show how similar structures were also used in river environments.[229] These examples, however, show differences also in forms of the

[228] Busana, 'Fishing, fish farming': 14.

[229] For Maubuisson see P. Benoit – M. Wabont, 'Mittlelalterliche Wasserversorgung in Frankreich. Eine Fallstudie: Die Zisterzienser', in *Die Wasserversorgung im Mittelalter* (Mainz 1991): 212-216. For the case

ponds and their location in relation to the monastery or other structures of the estates. The more complex structures have been recognised close to Glastonbury Abbey, where the monks starting from the eleventh century modified the nearby environment managing their water-sources which brought to establish a large fishery in the area of Maere Pool. This fishery seems to combine different fishing structures that developed during the middle ages. The archaeological evidence shows a large use of fish weirs close to river Brue canals, while written records recognised the presence of fishing baskets and nets – as documented in the fifteenth century – placed in the large marshy area characterising Meare Pool.[230] At the centre of the fishery the Abbot's Fish House is the core of a series of ponds located eastward of the manor house. In the Abbot's Fish House three cells have been recognised in which fish was processed and stored.[231] Even if the majority of the structures in Meare Pool are late medieval, it is possible to hypothesise similar managements also in the early middle ages, perhaps with a larger use of wood.

Looking at the different examples from the Roman to the late medieval periods, it seems probable that the terms *piscaria* or *piscatio* in the early medieval Po valley could only partially imply the presence of pools and ponds. A series of other structures could have been associated to ponds likewise watermills were not only a wooden house close to a watercourse. Fisheries could also exclude classical ponds in their structure, replacing them with pools directly made in the water or with other tools and structures. For example, in Ireland – as in Glastonbury – fish weirs have been considered as a sign of the presence of fisheries, as observed also in much more later fisheries like the nineteenth century cases in the river Boyne, in which the use of traps, weirs and nets was much more common than ponds.[232]

Looking at previous and more recent examples, it is evident how fisheries were subject to different factors and an ideal prototype cannot be seriously considered. On the contrary, the presence of different tools in archaeology and the specification of different fishing methods should imply a far more complex scenario that at the actual state of research in northern Italy cannot provide further details.

Piscaria, piscatio and the origin of the ius piscandi

One of the most important implications highlighted in the early medieval documentation on northern Italian fisheries is the development and the spread in those years of fishing rights. In

in Glastonbury see S. Rippon, 'Water and wetlands in medieval estate management: Glastonbury Abbey, Meare and the Somerset Levels in South West England', *Ruralia* 5 (2005): 93-112.

[230] Rippon, 'Water and wetlands': 93-112.

[231] *Ibid*.: 106.

[232] A.E.J. Went, 'Material for a History of the Fisheries of the River Boyne', *Journal of the County Louth Archaeological Society* 13 (1953): 18-33.

fact, even if private fisheries were surely present in the antiquity, Roman laws do not explicitly forbid people to exercise their right of fishing in a determined area. It is likely that certain limitations were active also during the Roman period, but in general this is not clear in Roman codes which do not allow it to be understood if water was subject to particular lordships. In the mid-sixth century, the *Institutiones* of Justinian, on the contrary, highlight how fishing, especially along rivers, was free for everyone and untaxed.[233]

According to Paolo Squatriti – and Giuseppe Mira before him – the introduction of this legal connotation connected to fishing and water privatisation – that in the later centuries developed in the communal conceptions of the *jus piscandi* – seems the most important original pattern connected to early medieval fishing, especially in northern Italy.[234] In fact, the authors recognised two terms linked to fishing activity in the documents of this area with two slightly different meanings: *piscaria* and *piscatio*.

The first can be in general associated in northern Italy with other Latin terms like *vivaria* or *piscina*. According to Squatriti, these terms seem to imply a structural description of a fishery or a fishing reserve.[235] Therefore, when in the year 753 – according to the mentioned forged diploma – Aistulf donated the *piscarias* in the territories of Reggio Emilia and *Flexo* to the monastery of San Silvestro of Nonantola or in 879 Louis III confirms to the bishop of Como, Angilbertus, of the *piscarias* in the Como lake, these should refer to the structures (ponds, nets, weirs, traps, storehouse) that we mentioned above and were characterising those particular fisheries.[236] On the other hand, *piscatio* – with its most common declined forms *piscatione* and *piscationibus* – is a term implying more juridical and legal aspects, representing the actual novelty of the early medieval documentation compared to the Roman one. In fact, when Carloman in 878 promulgates a diploma for the monastery of San Zeno of Verona, *piscationes* refers not only to particular fisheries but to the fishing rights on the Benaco river.[237]

The difference between *piscaria* and *piscatio*, as already noted by Paolo Squatriti, seems to be an original pattern of northern Italy because it is not easily distinguishable in other areas. In fact, in southern Italy – as in south western France and northern Europe – this distinction seems much less evident considering that *piscaria* and *piscatio* should refer both to the same concept: a fishing reserve.[238]

---

[233] *Institutiones*, I/2: «*Flumina autem omnia et portus publica sunt, ideoque jus piscandi omnibus commune est in portu fluminibusque*».

[234] Squatriti, *Water and Society*: 101; Mira, *La pesca*: 1.

[235] Squatriti, *Water and Society*: 105-109. Nevertheless, even if *piscaria* could be a more explicit term, *piscatio* could also imply the presence of fisheries in the area.

[236] CDL III/I, 26. CDL, 281.

[237] CDL, 277: «*et ripas, piscationes et venationes, pascuos usque ad arcem Minervae, Scovolo ac per totas ripas lacus seu cum omnibus casis et revus quae Adelbertus habet in Insola ac in Scuvola* […]».

[238] Squatriti, *Water and society*: 104. In fact, in the northern polyptychs like Lörsch, there is no mention of *piscatio*, while *piscatione* seems to be the most used, identifying not just a specific fishery but a fishing

Nevertheless, even if in some northern Italian charters this distinction in the vocabulary is clear, not all the evidence can be put into these two different categories. On the contrary it seems that some cases refer to *piscaria* and *piscatio* inverting the supposed meanings, a pattern that complicates the picture. A clear example of this can be seen in an Istrian very early document of the mid-sixth century. In 543, in fact, the bishop of Poreč, Euphrasius, issuing on the taxation of his, claims the third part of the saltpan in the isle of *Brivona* and the third part of the fishery (*tertiam partem de piscatione*) of the church of San Mauro *de ripa Lemi* for the canons.[239] In this sense, the term *piscatione* that should refer to the fishing rights of the church on *ripa Lemi*, could also imply the presence of a fishery, considering that the document is reporting about specific structures like the saltpan.

A similar ambiguity of meaning is evident also in later eighth and ninth-century examples. In the 753 donation of Aistulf for the monastery of San Silvestro of Nonantola, in which the king concedes to the monks the rights of fishing in the Emilian watercourses, it is specified that the monastery should obtain the *medietatem de piscationis* in Sermide and Bondeno, build fishing structures along the Panaro (*piscationes facere*), and having control of the fisheries (*piscarias*) in the territories of Reggio and *Flexo*.[240] In this document both *piscatio*, which seems to refer to the specific structures in Sermide, Bondeno and the ones to build along the Panaro, but also *piscarias* seems to imply that the monastery might fish in the watercourses in these territories.

This ambiguity of terminology is also reported in later Carolingian documents. In the 852 diploma for the church of Como, Louis II – recalling the previous concession of Lothar I – confirms to the bishop Amalricus the reconstruction of a fishery in the lake. However, it seems that in this case the use of *piscariam* or *piscationem* is not implying different meanings, as both terms refer to the same fishery.[241]

Taking all these examples together, it seems that, even if in certain cases there was a proper structural and legal distinction between *piscaria* and *piscatio*, a clear separation between the terms is not always certain. In these cases, the context of the document helps to identify the correct meaning, avoiding generalisation and allowing a more precise interpretation of the sources. For the ninth-century cases of the Lucchesia, Paolo Squatriti suggested a difference between fisheries (*piscariae*) and exclusive fishing preserves (*piscationes*), but we recognised that in other cases in ninth-century northern Italy, like Como, the two terms could simply have been used as synonyms. A clear distinction between fishing rights (*ius piscandi*) and structures

area, including – possibly – fishing rights and structures. The use *vivarium* referring to fishing reserves is also another popular term used especially in southern Italy, see *Ibid*. note 14.

[239] CDI, I/20. The present-day location of the saltpan and the fishery is not clear.

[240] Brühl, CDL III/I, 1.

[241] DD L II, 10; DD Lo I, 157.

(*viridarium*, *piscaria*) is evident in the following centuries in royal and communal concessions like the one for the monastery of San Salvatore in Pavia that a part from single fisheries it also obtained – firstly from the empress Adelaide and later confirmed by Otto III – fishing rights between the Ticino and the Po.[242]

Doubtless this change towards a privatisation of fishing rights began in the early middle ages. This is evident in the *placitum* of 804 held by the *missi* of Charlemagne and Pippin in Istria, for deliberating on the dispute between the bishop of Grado and the local Istrian noblemen against the duke John concerning the denial of some traditional rights. Among these rights, the Istrian noblemen claimed that their custom of public fishing in the sea was not respected and asked previous tradition to be restored.[243] In this case, the local claims were satisfied – even if we do not know for how long - but the document explicitly reported that fishing rights were changed.

In the Po valley, the first signs of this change are visible the late Lombard period. A first example could be seen in a twelfth-century forged diploma that reports the concession of fishing rights along the Ticino by Liutprand to the monastery of San Pietro in Ciel d'Oro in Pavia in 714.[244] Also the already mentioned forged 753 donation of Aistulf for San Silvestro of Nonantola, in which the king concedes to the monks the rights of fishing in the Emilian watercourses, could be considered one of the first mentions in this sense, as well as the later confirmations by Desiderius and the following confirmation for San Salvatore of Brescia in 771.[245] Squatriti suggested that these concessions started in a moment in which the central power was weak using as examples the conceptions of Desiderio and Lothar I in the Lombard and Carolingian northern Italy.[246] However, looking at the list of documents regulating concessions and donations of fishing rights, it is evident that this process was much more linear, not necessarily following some kingship crisis (see Tab. 8). The visible trend in this case is the increase of documents on fishing rights and concessions throughout the Carolingian period, in particular after Louis II and increasing over the last decades of the ninth century, becoming even more frequent in the tenth and eleventh centuries, as noted by Mira.[247]

One question that can be asked at this point is: who was the owner of fishing rights? Kings originally held rights over fishing and since the beginning of the eighth century they started to progressively concede the control of these rights to their principal monastic and episcopal

[242] On this example and other see Mira, *La pesca*: 11-27.
[243] *Placiti*, 17: «VIII *Maria vero publica, ubi omnis populus communiter piscabant, modo ausi non sumus piscare, qui cum fustibus nos caedunt, et retia nostra concidunt*».
[244] CDL III/I, 11.
[245] CDL III/I, 1. *Santa Giulia I*, CDLM, 17.
[246] Squatriti, *Water and society*: 109.
[247] Mira, *La pesca*: 11-27.

allies. In fact, the documents of the eighth and ninth-century northern Italy mainly report monasteries and churches as principal beneficiaries. Nevertheless, some rare cases confirm that also other people could own private fisheries or fishing rights. Among the charters of Ravenna, for example, is an 896 donation of the properties, listing several fisheries in Romagna, made by the countess Ingelrada to her son Paul – a deacon of Ravenna – previously owned by her dead husband, the duke Martin. It shows how control over fisheries and fishing areas was not necessarily public or strictly dependent on royal, monastic or church business, but that private and lay people also were allowed to exercise fishing rights.[248]

Certainly, for these private interests competition with monasteries and other ecclesiastical institutions was particularly tough. Disputes about fishing rights and properties reported in the *placita* shows how maintaining control over these was crucial, granting a regular production and economic income, perhaps to invest in local and regional markets. The deliberations of the *placita* show also how winning a dispute against the monasteries was not easy. In 824, in fact, even if the people from Fiesso brought a *preceptum* of Liutprand as proof, the judges issued in favour of the monastery of San Silvestro of Nonantola, which had been accused of practicing illegitimate fishing and pasture rights in the territories of Fiesso and Reggio.[249] Similarly, in 830 another *placitum* shows the solution of a dispute in favour of the monastery of San Fiorenzo in Fiorenzuola, in the territory of Piacenza, which had to defend its fishing rights on a fishery called Fischina, in the territory of Parma, from the claim moved from Urso, a priest and *vicedomino*, which ordered his men to fish in the mentioned fishery.[250]

Overall, even if the documents available mainly report monasteries and churches as the principal owner of fishing rights and activities, it is not to underestimate the role that also lay people could have had. Certainly, monasteries and bishoprics exercised a primary role in this context,[251] but – as partially anticipated – they were not the only characters to coordinate fishing activity in the Po valley.

Fishers of the Po

Considering fishing rights, structures and their owners in the Lombard and Carolingian Po valley, some remarks are necessary about the people who could fish directly in freshwater, the *piscatores*, and the relationships that developed with them.

In general, it is not easy to identify for the eighth and long ninth centuries who were the local people that were in charge of managing fisheries or catching fresh fish for their own

[248] Benericetti, *Le carte ravennati VIII-IX*, 54.
[249] *Placiti*, 36.
[250] *Ibid*., 40.
[251] On this topic see also E.F. Arnold, 'Engineering Miracles: Water Control, Conversion and the Creation of a Religious Landscape in the Medieval Ardennes', *Environment and History* 13 (2007): 477-502.

interest or for someone else. Even if it is possible to identify private owners beneficed through the promulgation of royal documents confirming that ecclesiastical institutions were not owning the exclusivity on fishing issues in the Po valley, these people were not necessarily *piscatores*. For example, king Berengar I in 890 gave to a priest, John, his *curtis* in Mercoriatico in the territory of Reggio, along with its *piscationes*.[252] It seems, therefore, that individuals could own fishing rights and be allowed to fish along both internal waters and sea, but it is also implicit that the priest John was not the direct exploiter of his fishing rights. Priest John needed collaborators, workers or simply tenants.

Evidence for *piscatores*, in the charters of the eighth and ninth century Po valley, is scarce. Even in ecclesiastical documents, in fact, evidence of fishers (*piscatores*) is limited to few cases. At the end of the ninth century, ten fishers working on Lake Iseo were supposed to provide 1200 fish per year to the monastery of Santa Giulia of Brescia.[253] The information in the polyptych implies that these fishers were servants of the monastery and their fishing rights were strictly connected to and conceded by the monastery itself. Nevertheless, it is also implicit that these fishers could catch more fish during the year to consume, process or even trade without necessarily asking further permissions from Santa Giulia.

The fishers of Lake Iseo were therefore local people that seem to be allowed to work only after the concession of the monastery, but their link with the monks could possibly allow them to continue their profession throughout the year. This type of *piscator* could be classified as a semi-professional fisher, dependant on their landlord, but probably they also did other work in order to survive when their duty to the monastery was fulfilled. Nevertheless, these fishers dependent on monastic institutions cannot be considered the only people allowed to fish in the early medieval Po valley, even if the majority of the sources in the rest of the Italian peninsula seems to suggest so.[254] Even if fishing rights seems to be restrictive, it was possible that ordinary people in general were also accustomed to fish in the closest stream or lake, perhaps paying a tax or simply not respecting the restrictions as the disputes in the *placita* suggest.[255]

Unfortunately, the documents of the eighth and ninth centuries do not specify the presence of other types of fishers in the Po valley. However, a few particular cases could allow us to hypothesise a second – and most interesting – professional figure. Some clues about the

[252] DD Ber I, 10.
[253] Santa Giulia, *Inventarii*, 58.
[254] For example, *piscatores* are named among the serves of Farfa (CDL IV/I, 23) and Montecassino (here we also have names: Anscausu et Fuscari, CDL IV/I, 36).
[255] *Placiti*, 36. In the late ninth-century Tuscany, the *inventario* of the archbishopric of Lucca show that Lapulo of Arena was supposed to give to the church seven *pisces* (Lucca, *Inventari*, 200). This act has been explained as a sort of token fish for the archbishop, nonetheless, Lapulo should have had fishing rights somewhere in order to fulfil its duty. It was possible that others could have followed a similar scheme. See Squatriti, *Water and society*: 123.

existence of specialised freshwater fishers, in fact, came from two tenth and eleventh-century documents: the *Carta piscatoria* of Ravenna and the *Honorantiae civitatis Papie*. The first is an original 943 charter, reporting a *peticio* of emphyteusis for the archbishop of Ravenna, Peter. The *peticio* was moved by 11 members of the *Scola piscatorum Patoreno* asking for the right to fish (*licentiam piscandi*) in the Padoreno and in inland waters of the Exarchate between the locality of *Pensalardo* to the sea, with the obligation of giving to the church the 40th part (*quadragesimam*) of the catch, either in kind or in silver, and to the archbishop himself every sturgeon and adello (*adalum*) longer than four feet.[256] A part from the mention of a corporation of fishers in the mid-tenth-century Ravennate, another indication of fishing activity for the earlier period, particularly since the eighth century, along the Padoreno is in the Life of the archbishop Felix, written in the *Liber pontificalis* by Agnellus of Ravenna.[257] It is possible, therefore, that a *scola piscatorum* – or a first group of fishers that later created the *scola* – was already in activity since that time, considering that the 943 charter reports that its fishers already were accustomed to fish along the Padoreno specifying *ubi soliti sumus piscari*.[258]

Moving westward and slightly forward in time, explicit mention of associations of fishers is also in the *Honorantiae*. This important text describing the socio-economic patterns of the tenth-eleventh century Pavia clearly reports the presence in the city of a corporation (*ministerium*) of fishers working on the Ticino and Po on 60 vessels. As for the other *ministeria* these professional fishers were at the service of the *camera regnum* and were required to pay a monthly tax of two *denarii* for each *navis* for exercising their right to fish, and as well as giving part of the catch to the king or to the master of the chamber every Friday.[259]

The group of fishers in Ravenna and Pavia could be considered as an archetypical form of guilds that started to develop in the communal period and expanded throughout Europe in the later centuries.[260] The presence of specialised fishers, however, could be assumed also in

---

[256] Benericetti, *Le carte ravennati X*, 48. The *Scola* cited in the text is the *schola piscatorum* called Casa Matha, still in activity in present-day Ravenna, see S. Franchini, *L'Ordo Domus Mathae di Ravenna. Identità giuridica e sopravvivenza storica di una corporazione medievale*, PhD Thesis (University of Ferrara 2001-2002). The Padoreno was probably a branch of the present-day Reno river that was passing north-west of Ravenna, flowing into the delta area of the Po (see Chapter 1). *Adalum* should refer to a larger type of sturgeon common in the Po, see G. Arrivabene, *Dizionario domestico* (Brescia 1809): 327.

[257] In the text, it is mentioned that the Padoreno (*Patereno*) was poisoned by the corps of the Greeks, making impossible to fish along the river for the next six years. Agnello, *Liber pontificalis*, 153.

[258] Camillo Spreti, in his *Notizie spettanti all'antichissima Scola de' Pescatori in oggi denominata casa Matha* (Ravenna 1820), indicates that the *scola* was already active at the time of Justinian II, but there is no evidence to support this claim.

[259] *Honorantiae civitatis Papie*, SS, 30/2, 11: «*Sunt autem piscatores in Papia, qui ex omnibus bonis debent habere unum magistrum et debent habere sexaginta naves et pro unaquaque navi debent dare duos denarius per omnes kalendas; qui denarii kalendarum debent de ipsis denariis pisses comparare aut suo cum honore semel in ebdomanda eos adducer et magistro camera pisses dare omni die Veneris*».

[260] P. Racine, 'Associations de marchands et associations de métiers en Italie de 600 à 1200', in B. Schwineköper (ed.), *Gilden und Zünfte. Kaufmännische und gewerbliche Genossenschaften im frühen und hohen Mittelalter* (Sigmaringen, 1985): 127-149.

the previous period as the examples of Bondeno and Sermide, located along the Po main course in the tract between Ostiglia and Ferrara, suggest.

A first mention of fishing activity associated to these territories in early medieval documents are in the forged 753 diploma of Aistulf. In the donation for the monastery of San Silvestro of Nonantola, in fact, the Lombard king concedes half of the fisheries located in the *loci* of Sermide and Bondeno.[261] Fishing interest in these areas is confirmed also in the *placitum* held by the count Oddo in 818 at Revere regulating the dispute between San Silvestro and the royal fiscus. These territories seem, in fact, particularly important for the royal fiscus and the monastery especially for breeding, hunting and fishing activities.[262] It seems that between Sermide and Bondeno a large portion of the territory, mainly occupied by wood and wetlands, between the eighth and the ninth century an important production was developed specialised on animal products. The main beneficiaries of this production were San Silvestro and the crown, even if the monastery seems to exercise a progressive appropriation over the fishing activity and business as testified by the confirmations of the fishing rights in Bondeno and over the area between Mantua and Ravenna by Otto II in 982.

Fishing, however, seems the principal activity that interested the monks of San Silvestro. Between the ninth and the tenth century, in fact, the fishery in Bondeno is explicitly mentioned, while a fishery in Sermide provided the monastery of Santa Giulia of Brescia with two pounds of silver in fish per year.[263] The importance of Bondeno as an evidenced fishing centre could also be seen in a later 1068 donation, in which the abbot of Nonantola, Landolfus, concedes to the church of Palata Pepoli, in the territory of Bologna, a fisher from Bondeno, specifying *cum omnibus suis condictionibus et utilitatibus* referring perhaps also to his fishing rights. Bondeno and Sermide seems, therefore, to have been places in which fishing was one of the most important activities carried out locally, partially coordinated by the monks.

The importance of fishing for these settlements is clearly expressed by Carluccio Frison. In particularly for Bondeno, Frison hypothesises that the first nucleus of the later eleventh-century *castrum* was founded by a group of fishers probably already at the dependence of the monastery of Nonantola.[264] In my view this suggestive hypothesis could only be partially considered: in fact, we know from the documents that fishing was only one of the activities mentioned in this area of the Po valley between Sermide and Bondeno. Therefore, the

[261] CDL III/I, 1, «*medietatem ex piscariis in territorio Mantuano in loco Sarmata et Bondeno*».
[262] CDL, 93.
[263] DD Ber I, 81: «*super ripam fluvii Burriane ubi vocatur Piscariam praedicti monasterii cum universis aedificiis suis et omnium suorum hominum ibi aspicientium cum paludibus et piscariis a fluvio Bundino usque in loco qui dicitur Spino*». DD Hug, 2: «*Bondeno, ubi Piscaria dicitur, quod ius Sancti Silvestri esse videtur*». Corte Migliarina, *Inventari*, «*Et est in ipsa pescaria vel silva in Sarmida*». See Frison, 'Bondeno': 310.
[264] Frison, 'Bondeno: 307-314.

community cannot be considered only as a fishers' cluster. On the contrary, considering the pastoral activity carried out in nearby areas like in the *insula Viciana* (probably present-day San Biagio delle Vezzane) as recorded in 841,[265] it seems more likely that these communities were focusing on different farming activities.

However, the hypothetical presence of specialised fishers in these communities, does not seem to contrast with the overview provided by these documents. The explicit mention of *ministeria* of *pescatores* in Ravenna and Pavia in the later centuries could partially reinforce this interpretation. The environmental features of this section of the Po also allow this landscape to be considered ideal for fishing, as in other areas of the Po valley, encouraging the development of fishers' corporations.[266] Nevertheless, even if among the people inhabiting the early medieval sites in Bondeno and Sermide there were some good and specialised fishers, especially between the eighth and ninth centuries, they were also focused on other animal farming – as it was for other rural sites as explained in Chapter 3.2 – and, most importantly, were dependent to the monastery of Nonantola.

Overall – as Richard Hoffmann suggests in his overview on fishing activity in medieval Europe – it is possible to hypothesise in the early medieval Po valley the presence of two types of fishing activities: one operating directly, in which the fishers were also owners of the fishing rights (as was the case for the fishers of the *ministerium* in Pavia or of the *scola* in Ravenna), and a second indirect one, managed by servants working for larger landlords.[267] Both the types of fishing activity were managed by people aware of their environment and rights, but the first 'private' fishers seem recognised as specialised professionals only from the tenth century onwards, while the seconds – considered more like part-time fishers – seem the most common figures active on internal waters in the eighth and ninth-century Po valley.

Considerations

Fishing in the early medieval Po valley was probably one of the most important aspects of everyday life. Even if there is not much evidence, the combination of written and archaeological sources suggests that production, consumption, transport and possibly local and regional trade of freshwater fish was an important pattern in both Lombard and Carolingian northern Italy.

However – according to the available sources – these practices are fairly obscure and investigation on them is only possible through the consideration of a larger temporal and geographical spectrum allowing us to understand the differences between fishing practices and structures between the Roman period and the late middle ages. These comparisons show how

[265] *Ibid*.: 310.
[266] See Chapter 1.
[267] Hoffmann, 'A brief history': 23-24.

several practices were maintained through the centuries, allowing us to hypothesise their use also in the eighth and long ninth century.

In addition, it is clear that almost all the available evidence for early medieval fishing in the Po valley is provided by written documents. The lack of archaeological materials is a serious gap. Even if comparisons could be made with other regions in Europe, this gap compromises the overall picture not allowing a uniform study of the functions and uses of early medieval *piscariae* or *piscationes* in this territory. Only with a bigger archaeological database it would be possible to verify if the trends recognised in other areas are actually replicable or if original patterns were formed in the Lombard and Carolingian Po valley. Given the current state of research, we can only focus on a partial socio-economic perspective of fishing. The sources allow us to understand that fish farming and trade were part of the socio-economic networks that had at their centre monasteries and churches. However, it can be argued that these networks were only one manifestation of these practices. These circuits are confirmed by the only archaeological evidence on fish trade and movement available in the Po valley, but it is questionable that ecclesiastical institutions were the only motor for them.

The documents, in addition, show how lords and rulers were interested in the legal aspects linked to fishing. As it was also observed for watermills, the search for the recognition of water rights was a constant pattern for these early medieval societies. These rights were a motor of the economy themselves, not necessarily a limitation, allowing the formation of networks linked to the use of water involving many parts of the society as the example of San Colombano properties on the Mincio shows. In fishing the search and the division of these rights is much more evident compared to the previous centuries, identifying in the early middle ages the moment in which previous power and economic balances changed through what Paolo Squatriti defined as a 'patrimonialisation of water rights', according to which, alongside kings, also other landlords owned and exchanged water rights, possibly influencing their relationships with their environment and societies, in both rural and urban contexts.[268] This form of privatisation of water rights and practices can be considered a new pattern of the early medieval Po valley and should deeply affect the river landscape.

Fishing, as water milling, was both a reflection of these new policies but also a motor. In the Po valley, an area profoundly influenced by water, their presence finds a better integration with the surrounding landscape, but strongly impacting upon it at the same time. The spread of *piscariae* and *piscationes* recorded in the documents and potentially visible through archaeology allows us to hypothesise that the synergy with the Po, its tributaries and other sources of water brought to the formation of a society and an economy that had the river at their bases, sharing

[268] Squatriti, *Water and society*: 89-93.

and extending the characteristics of the amphibious culture, and allowing the formation of an original early medieval riverscape. Nevertheless, it is not easy to understand how the environment was affected by them, and also in this direction the research must proceed.

Conclusions: the environmental history of rivers as an approach to the analysis of socio-economic patterns in the early medieval Po valley

Throughout this thesis the study of riverscapes, as already mentioned at the outset, has enabled the analysis of a wide range of topics, including, but not limited to, transport and mobility patterns, usually, with some justification, regarded by economic historians and archaeologists as the main characteristic of early medieval rivers.[1] Rivers, alongside the societies that lived with them, created interesting ecosystems which developed over time and adapted to diverse environmental, political and social situations. In each chapter, the impact of the Po, its direct tributaries and secondary watercourses on the northern Italian people who lived in the eighth and long ninth centuries has been explored. The multidisciplinary analysis allowed to extend the study of the riverscape providing evidence of different patterns and allowing a comparison between them, not being confined necessarily to limited documentary sources or archaeological finds. The dialogue between these different disciplines has been necessary for the recognition of the amphibious dynamics and variability as the most recurring characteristics of the riverscape.

Since Chapter 1, it has been clear that the changes of rulership in the Po valley as across the rest of the Italian peninsula left some traces in the natural elements of the landscape: in fact, riverscapes are best understood as embodying a relationship between human presence and the environment. The Franco-Carolingian impact on watery environments, however, seems much less evident compared to the radical changes seen during the Gothic wars and the sixth and seventh centuries that brought rapid modifications to the entire landscape. Climate change also played an important part in this modification and surely also affected the new early medieval patterns which were characterised – from the late Lombard period – by the stabilisation of warmer temperatures. As already pointed out, however, it is important to stress once again that these morphogenetic factors and changes in temperatures cannot be considered the principal motor for new socio-economic patterns, but certainly allowed the formation of a landscape – and riverscape – with a higher agricultural productivity and an easier possibility to travel compared to the previous period; all

[1] For this see, in particular, McCormick, *Origins*: 64-82. However, this approach to the Po was also evident in early twentieth-century works, summarised in the system proposed by Cinzio Violante in his *La società*. This approach is often highlighted also for other periods (e.g. for the Roman period see B. Campbell, *Rivers and the Power of Ancient Rome* (Chapel Hill 2012): 200-245) tending to focus the minds of researchers on the uses and resources of the rivers. It is, however, important to look in greater depth for a more complete picture.

patterns that also characterised northern Italian society between the eighth and the early tenth centuries.

As demonstrated in Chapter 2, since the Lombard period but with more consistent documentary evidence for Carolingian times, rivers were considered fundamental elements for movement and communication patterns. Watercourses in general can be considered connectors for these societies, and the intensification of travels in the Po valley testifies how this route was one of the most used in eighth-, ninth- and early tenth-century Europe. There are various examples of people who travelled for economic, political, religious or personal business both on freshwater and by land. This was also reflected in legislation, which periodically records a progressive care for control and maintenance of structures like bridges, roads and ports. Nevertheless, the lack of archaeological evidence does not allow us to see how much these specific laws could have promoted entirely new elements of the riverscape, as similar structures might possibly have already been in use in previous centuries, perhaps organised in small clusters that controlled single sections of the rivers, as is partially visible in some areas including the territory of Nonantola from the 750s.[2] The Frankish legislation, however, can certainly be read as demonstrating conscious knowledge of the possibilities and the difficulties of land and water routes, aspects that necessarily presumed particular socio-economic and political interests by Carolingian rulers in an efficient transport system which would allow armies to move better, goods to circulate regularly and messengers to reach all the crucial territories of the kingdom and the empire.

The centrality of the river in the movement patterns of early medieval northern Italy is clear also when the renewal and foundation of old and new settlements both in urban and rural contexts is taken into consideration. These settlements grew close to and developed strong links with the rivers, taking advantage of the uses of freshwater both for transport and agricultural patterns. The second half of the ninth century can be considered a sort of turning point compared to the period before, especially in the countryside, in which new agglomerations started to spread in the plain following the mutations of river ridges and meanders. The rapid growth of the river cities, especially Ferrara, between the ninth and the tenth century, a period of strong political instability, can be considered as well as directly connected to the river exploitation. This cannot be observed in the previous Lombard period, even if several burial sites confirm in many cases – as shown in Chapter 3 – continuity of settlement also in the century after with small changes possibly due to the mutations in watercourses. Nevertheless, since the Lombard period – or at least since the period taken into consideration in this

[2] The confirmation of properties and rights on watercourses for San Silvestro of Nonantola during the early ninth century probably reflects a situation that had developed since the foundation of its patrimony in the century before and that over the decades was likely to have been reinforced as the interests of the monastery in its territory increased. See Manarini, 'Politiche regie', and Chapter 4.2.

research – water was a fundamental element of the landscape. Its seasonal instability was a pattern that the societies who lived in the Po valley seemed to accept, adapting to it for their benefits and shaping settlements according to it.

As explored in the last chapter of the thesis, the river was, in fact, an important resource for its society: from the creation of local, interregional and – in some cases – international economic networks to the development of production centres along its waters – like fisheries – which enabled centres of socio-economic power to be established waterside. For example, the establishment of mills and markets in both urban and rural areas which were not necessarily linked to the political and economic interests of the crown. The majority of these networks become visible through the sources from the ninth century onwards but their roots could be traced back to the previous period, at least when the last Lombard kings started to promote the economic network of the monasteries and the regulation of trade as in the case of salt and the other goods from Comacchio.

The study of the Po valley from an environmental and socio-economic point of view has allowed a different analysis for the early middle ages starting from a natural element (the river and internal waters) in order to look at contemporary societies with a different perspective, focused on the link between man and nature. From this perspective, it has been possible to observe different attitudes by which early medieval societies adapted, exploited and lived with the river and wetlands in northern Italy and, in some cases, it has been possible to recognise signs of specific rulership over the riverscape. In the Carolingian period, however, the documents allow us to recognise a more institutionalised system of controls over internal waters, a process that find a more complete form in the following tenth century. For this reason, the expression " long ninth century" used throughout the thesis it seems more accurate for the analysis of the late Lombard and Carolingian Po valley riverscape in order to have a clearer picture and avoiding traditional temporal divisions that see the death of Charles the Fat in 888 as the end of the Carolingian influence in Europe.[3] In addition, the lack of Carolingian archaeological materials like coins or pottery do not help in the recognition of a direct influence of the new rulers of northern Italy on the Po valley riverscape patterns.

The only retraceable Carolingian element of the riverscape emerges from the textual evidence. According to the charters, the river, originally property of the royal fisc, was then privatised and split in sectors with different owners and landlords, following a similar division of the land. This process, however, cannot be considered entirely an original Carolingian pattern being already started since the late seventh and, especially, eighth century by the Lombard kings, even if less evidence has survived for these years.

[3] See Introduction note 2.

Looking both at the documents and material evidence, however, a stronger change in the relationship between river and society is evident in the centuries after the ninth, in which a new appropriation and management of the landscape brought to a stricter control over freshwater and a different exploitation of river especially in the countryside, all aspects that had an impact on the river societies of northern Italy, as the development of settlements like Nogara, Sant'Agata Bolognese and Ferrara seems to suggest. As Paolo Squatriti noted at the end of the 1990s, water management shows the development of a new early medieval trend and tradition strongly tending towards a progressive privatisation and division of land and water in the riverscape.[4] This tradition, however, seems to form into a new organisation of the riverscape and an original amphibious culture only at the end of the period considered, despite changes were evident since the sixth century. According to written documentation – specifically royal diplomas and laws – in the ninth century the new political establishment in Italy conditioned the creation of an articulated society working and living in the riverscape that in later centuries gave rise to the development of those corporations of workers, fishers, and merchants recognised in contemporary documents including the early eleventh-century *Honorantiae civitatis Papiae*.

The Carolingians probably influenced this process but establishing a clear and direct connection between a hypothetical institutionalisation of these practices and their actual spread in the riverscape driven by a conscious socio-economic and political plan by the new Frankish elite is hazardous and not scientifically accurate. Local traditions seem to recall pre-existent amphibious cultures, already present in the territory and none of these traditions can be described as a Carolingian peculiarity. The new Carolingian rulers had to deal with these local peculiarities along freshwaters – common also in other European riverscapes – enabling the creation of those small worlds, using Wendy Davies's words,[5] that in fact could be described as Carolingian only because the people concerned were living in that period, partially under their rule, but that were almost independent from Franco-Carolingian customs and usages.[6] Looking at the examples in rural areas, the organisation of land was far from being a direct consequence of the will of successive rulers, considering that most local sustenance derived in the ninth century as earlier from the surrounding environment, as the examples of Nogara, Sant'Agata, Milan and Brescia show, without specific coordination by the kings, even if some influences have been recognised in the management of the large properties in some areas as in Romagna.[7] Local lords, peasants, churches and monasteries completed the picture, leaving

[4] Squatriti, *Water and society*: 163-164.
[5] W. Davies, *Small Worlds: The Village Community in Early Medieval Brittany* (Los Angeles 1988).
[6] Similar results have been recognised also in the middle Rhine valley by Matthew Innes, *State and Society*: 253.
[7] Mancassola, *L'azienda curtense*. For Milan: Balzaretti, *The Lands*. For Brescia see the recent archaeobotanical studies of cereal consumption in the city testifying to a very local food supply: E. Castiglioni – M. Rottoli, 'Brescian archaeobotanical studies, Romanization to Early Medieval periods', *PCA* 8 (2018): 91-116.

the royal élites with only a part to play, mainly linked to political support strategies rather than economic ones, keeping all the rest for their own interests. In this sense, further analysis of single monastic or ecclesiastical institutions should provide a more detailed scenario, as shown by the case of Cassiano village from the Piacenza charters, in which the king's presence is not even considered in the management of the territory.

The mixture of these local customs and institutions left marks and were the bases for the tenth-century developments which followed in which a stronger link between urban and rural areas coordinated by the ruling élite is evident and was mainly conducted through the watercourses that connected a city to its territory.[8] In this picture, therefore, the Lombard and Carolingian presence cannot be clearly recognised with specific features retraceable in the riverscape, or better, with specific elements that could have been derived from initial management by Lombard or Carolingian rulers. More evident is a trend that runs across the eighth and the long ninth centuries highlighting a renovated relationship with rivers and wetlands perhaps after some tough decades during the sixth and seventh centuries, conditioned by political and environmental instability. The Po valley at the dawn of the middle ages was a land of rivers and different societies with different needs entrusted their growth to them. These societies always had the river at their heart, as specific kingships came and went.

[8] Campopiano, 'Rural communities': 37-41.

Appendix: Tables

Tab. 1: Recorded travels crossing northern Italy and the Po valley between the 8th and 9th centuries*

Name	Route, Place	Reason	Source
Liutprand	Pavia	*Pactum* with Comacchio's *milites*	*Constitutio Liuthprandi regis*
Ceolfrid	Britain-Rome	Pilgrimage	Bede, *Historia Ecclesiastica*, 16-21
Boniface (Archbishop)	Britain-Rome	Pilgrimage	*Vita Bonifatii*, SRG, V
Liutprand	Pavia-Sardinia-Pavia	Sant'Agostino's relics are bough back	HL, 6, 48
Willibald	Rouen-Tortona-Lucca	Pilgrimage	Vita Willibaldi, 3/4, Talbot, *Hodoeporicon*: 157
Lombards	Ravenna	Sac of the city. Pope Gregory asks Venetians for help	McCormick n. 137, HL 6, 54 Epist. Karol. I, 702
Anonyms	Pavia-Constantinople	Liutprand send them for royal business	McCormick n. 149-151
John	Constantinople-Rome-Pavia	Imperial business	McCormick n. 158
Hunuin	Britain-Rome	Messenger	Letter of abbot Cuthbert, EHD n. 185
Ælbert (Monk) Alcuin (Abbot)	Britain-Rome	Pilgrimage	Poet. Karol. I: 206 Epist. Karol. II, 172
Paul Afiarta	Ravenna-Venice-Constantinople	Exile	McCormick n. 179
Madalveo	Verdun-Alps-Rome.	Pilgrimage	McCormick n. 180 *Vita Madalvei*, SS 8: 345-347.
Adalgiso	Verona-Epirus-Constantinople	Escape, exile	McCormick n. 183; SRL 201.43-44
Alcuin (Abbot)	Britain-Rome	Royal mission	*Vita Alcuini*, SS, XV: 190
Charlemagne	Ravenna	Venetian merchants expelled	McCormick n. 216

788	Pope Adriano	Costantinople-Treviso/Ravenna	He writes Charlemagne for letting know about a possible invasion by Byzantium for restoring Adalgiso	McCormick n. 219
794	Witto (Priest)	Britain-Rome	Pilgrimage	Poet. Karol. I: 253
795	Odberht (Priest)	Britain-Rome	Pilgrimage	Epist. Karol. II: 100
795 ca	Anonyms	Venice-Jerusalem-Venice	Rescue of San Genasio and San Eugenio's relics	McCormick n. 230 *Miracula Genesii* (BHL 3314) 2: 9
796	Anonym merchants	Treviso-Venice-Jerusalem-Venice	Gebardo sent gifts to the patriarch asking for the relics	McCormick n. 233, *Miracula Genesii* (BHL 3314) 2: 9-10
797	Lantfrid, Sigismond, Isac,	Frankia-Treviso-Venice-Jerusalem-Baghdad	Charlemagne sent ambassadors to Harun al-Rashid	McCormick n. 238, AF: 116, *Miracula Genesii*: 10
801	Anonym ambassadors	Baghdad-Africa-Pisa-Vercelli/Ivrea	Harun al-Rashid sends ambassadors to Charlemagne, notice of the Elephant	McCormick n. 254, AF: 114-116.
801-802	Æthelheard (Archbishop)	Britain-Rome	Church mission	S. Allot, *Alcuin of York, c. A.D. 732 to 804 : his life and letters* (York 1974), 20
Christmas 805	Willeri, Beatus (Venetian doges), Paul and Donatus (Zara's Duke and bishop)	Zara-Venice-Thionville	They visit Charlemagne for discussing the division of Veneto and Dalmatia	McCormick n. 266, AF: 120-121
806	Ambassadors Lead by Radbertus	Baghdad-Jerusalem-Treviso	The embassy eludes the byzantine block in the Adriatic and arrives in Treviso	McCormick n. 271, AF: 122
807	Abdella	Baghdad-Jerusalem-Treviso-Aachen	The embassy brings exceptional gifts, they wait in Italy for the good season to take the sea.	McCormick n. 277, AF: 123-124.
808-809	Eardwulf (King) Eardwulf (Deacon)	Britain-Rome	Royal mission	ARF: 125-130
810	Eadburh (Queen)	Britain-Rome	Trade	*Asser*, c. 15

810	Arsafios	Constantinople-Pavia/Verona	Emissary from emperor Niceforo I for Pippin but, when he discovers him dead, he receives an order from Charlemagne to meet him at the other side of the Alps.	McCormick n. 296, AF: 132 Epist. Karol. II, 32
810-811	Arsafios	Venice	He works with the Venetians for putting Agnello as doge in place of Willeri and Beatus. Charles orders to send Willeri to Constantinople with his embassy.	McCormick n. 299, AF (810): 133-134
810	Arsafios	Pavia/Verona-Aachen	Charlemagne receives Arsafios	McCormick n. 297, AF (819): 133
810-811	Justinian	Venice-Constantinople-Venice	He goes to Constantinople where the emperor name him *hypatos* (governor), so he returns to Venice and became co-doge.	McCormick n. 305, *Cron. Ven.*: 106.15-18
813	Embassy	Aachen-Zara-Durres- Attica-Constantinople	Amalario of Metz and Peter of Nonantola goes to Constantinople	McCormick n. 316, AF: 137 Epist. Karol. II, 37
814	Amalario of Metz and Peter	Constantinople-Nonantola-Aachen	Return of the embassy. Bad weather, they avoid Slavs coast and escapes to a Moorish pirate ship.	McCormick n. 330, AF: 140
819	Louis the Pius's army	Italy-Alps-Pannonia/Dalmatia	Attack against Liudevit who is defeated near the Darva river. He escapes in Dalmatia when he fights Borna, Dalmatia's duke.	McCormick n. 360, AF: 150-151
819-829	Louis the Pious	Bergamo-Costantinople	Send John, who left Slav inland and escaped in Bergamo, to Constantinople according to the Venetian will.	McCormick n. 361 *Cron. Ven.*: 107.6-12.
821	Fortunato	Grad-Istria-Zara-Constantinople	He is summed in Aachen (suspect of having supported Liudevit) but he escapes in byzantine territories	McCormick n. 364, AF: 156-157.
821-828	Ambassador Agnello	Venice-Constantinople	Doge Agnello sends his nephew as ambassador to Constantinople	McCormick n. 371, *Cron. Ven.*: 107.16-17.
822	Italian army	Friuli-Pannonia	Military expedition against Liudevit, he escapes but wants to submit to Louis	McCormick n. 375, AF: 159; (824): 165-166.

824	Ambassadors	Constantinople-Venice-Rouen-Rome	Michel II envoys ambassadors to Louis the Pius for previous peace, a Frankish embassy and iconoclastic issues. Sent of gifts	McCormick n. 383, AF: 165.
826	George	Venice-Constantinople-Venice	The priest goes to Constantinople for learning how to build an organ	McCormick n. 394, AF: 170
828	Alitgarius Bishop of Cambrai and Ansfrid Abbot of Nonantola	Aachen-Constantinople	Embassy of Louis the Pious to Michel II	McCormick n. 403, AF: 174.
828	Dominicus	Comacchio-Jerusalem-Alessandria-Venice	Pilgrimage. 10 venetian ships arrive at Alessandria and take San Marco's relics	McCormick n. 405-6, E. Colombi (ed.), '*Translatio Marci Evangelistae Venecias*', *Hagiographica* 17 (2010): 73-139
839	Doge Peter	Venice-Neretva river	A fleet against the Slav pirates	McCormick n. 446, *Cron. Ven*.: 113.1-10.
840-842	Theodosius	Costantinople-Venice-Lothar court	He negotiates agreements for military alliance against Arabs.	
851-852	Benedict bishop of Cremona	Gondreville-Pavia-Cremona	Disputes for properties in Cremona.	McCormick n. 504, *Codex Siccardi*, CDLM, 7, 8, 9, 10
852	Louis II	Motovun-Pavia	On request of Abbot Felmo, Louis gives immunity and royal protection to the abbey of St Michel in Motovun (Poreč)	McCormick n. 507, D L II, n. 9.
855-56	Æthelwulf (Prince) Alfred (Prince)	Wessex-Rome	Pilgrimage	*Asser*, c. 11
864	Petrus Candianus	Venice-Constantinople	He is exiled in Constantinople	McCormick n. 550, *Cron. Ven*.: 118.4-8.
877	John VIII	Rome-Venice	He summons the doge of Venice for a synod in Ravenna for ending the fight between patriarchs of Aquileia and Grado	McCormick n. 639

877-878	Doge Orsus	Venice-Constantinople	He sends 12 bells for the new church of Basil in the Great Palace	McCormick n. 645 *Cron. Ven*.: 126.13-16
878-880	Anonyms	Constantinople-Venice	They bring gifts and the dignity of Prōtospatharios to doge Orsus	McCormick, n. 658 *Cron. Ven*.: 125.12-13
888	Beocca (Ealdorman) Æthelswith (Queen)	Britain-Rome	Pilgrimage Messenger	Dumville D. – Keynes S. (ed.), *Anglo-Saxon Chronicle I-V* (Cambridge 1986-2000)

*The table summarised information available in the appendixes in McCormick, *Origin*: 799-810, and Matthews, *Roads*: 59-78.

Tab. 2: Regulation on inland navigation and *naves*

Capitularia

Souverain	**Name**	**Content**	**Surce**
Liutprand	*Pactum* with the people of Comacchio	Tax on the goods transported *per singulas naves* in the ports along the Po.	Codex Siccardi, CDLM, 2; CDB VIII s., 1. CDL, 5
Charlemagne	*Capitula omnibus cognita facienda*	Presence of specific routes and stations c. 7: *Ut nullos homo praesumat teloneum in ullo loco accipere, nisi ubi antiquitus pontes constructi sunt et ubi navigia praecurrunt et antiqua videtur esse consuetudo.*	Capit. I/IV, 57: 144;
Louis the Pious	*Capitula Legibus Addenda*	Control of the licit tax collection c. 17: [...] *et ubi necesse non est fluvium aliquem ponte transmeare, vel ubi navis per mediam aquam aut sub pontem ierit et ad ripam non adpropinquaverit neque ibidem aliquid emptum vel venundatum fuerit, ulterius teloneum non detur*.	Capit. I/VIII, p. 284.
Louis the Pious	*Capitulare missorum*	Control of the licit tax collection c. 4: *De iniustis occasionibus (sicut sunt tribute et telonei in media via) ubi nec aqua nec palis nec pons nec aliquid tale fuerit unde iuste census exsigi possit, vel ubi naves subtus pontes transire solent, sive in medio flumine ubi nullum est obstaculum* […]	Capit. I/VIII, 141: 289

820	Louis the Pious	*Capitula de functionibus publicus*	Control of the licit tax collection c. 1: *Ubi telonea exigi et ubi non exigi debeant.* [...] *ominibus in imperio nostro* […] *ut nullus teloneum exigat nisi in merctibus* […], *neque in pontibus nisi ubi antiquitus telonea exigebantur, neque in ripis aquarum ubi tantum naves solent aliquibus noctibus manere* […] c. 2: *De dispensa fidelium nostrum: nemo in pontibus neque in navibus ab eis teloneum exigere praesumat*	Capit. I/VIII, 143: 294
840	Lothar II	*Pacta et praecepta venetica*	Regulation of the movements between Venetian Lagoon and inland territories c. 25: *Equilenses vero capulare debent* [...] *ubi minime presumat cum nave introire*	Capit. II/XVII, 233: 134
850	Louis II	*Hludowici II capitulare*	Control over the right structures of the rivers c. 3: *Pontes enim, ubicumque consueti sunt, permaxime Ticinensis, restaurentur; et ubicumque non sunsueti necessarii sunt, construantur. Navigia in consuetis locis preparata consistant* [...]	Capit. II/XVII, 211: 84
850	Louis II	*Capitularia exeunte papiae facta: capitula comitibus Papiae ab Hludowico II proposita*	Foundation of a proper fleet for the control of the coast c. 6: *Naves autem, quae propter custodiam littoris per mare sunt antiquitus ordinatae ad precavendas adversariorum insidias, qualiter secundum ordinem eundem reparatae fiant, oportune consulimus, quoniam hac desisia non modica ex parte populus noster inimicorum insidias sustinent*.	Capit. II/XVII, 212: 85
880	Charles III	*Pacta et praecepta venetica*	Confirmation of 840's *Pactum*	Capit. II/XVII, 236: 140

Royal Charters

Year	Souverain	Beneficiary	Content	Source
713	Liutprand	San Carpoforo (Como)	One *navium* on the Lake of Como	CDL III/1, 11 (13th c. forged, 16th c. copy)
714	Liutprand	San Pietro in Ciel d'Oro (Pavia)	General exemption for naves along the Ticino and the Po	CDL III/1, 11 (12th c. forged)

744	Hildeprand	SS Antonino e Vittore (Piacenza bishopric)	Presence of *navem militorium* in Codaleto. One *navem* for the poors	CDL III/1, 18 (10th c. copy)
752	Aistulf	San Silvestro of Nonantola	Exemption and freedom of movement for the *naves* along the Panaro and tributaries	CDL III/1, 26 (13th c. forged)
759	Desiderius	San Silvestro of Nonantola	Confirmation of Aistulf's diploma	CDL III/1, 32 (12th c. forged/copy)
774	Charlemagne	Novalesa (monastery)	General freedom of movement and exemption including water itineraries	DD Kar I, 225 (12th-14th c. forged)
//	Charlemagne	Grado (Church)	General freedom of movement and exemption including water itineraries	DD Kar I, 201
804	Charlemagne	Santa Maria in Organo (Verona)	General freedom of movement for its *naves*	DD Kar I, 272 (forged 11th c.)
822	Lothar I	Farfa	General exemption and freedom of movement for one *nave* both on internal waters and sea.	DD Lo I, 1
828	Gregory IV	Santa Giustina (Padova)	Confirmation of exemptions	CDP, 6 (14th century copy)
834	Lothar I	Santa Maria Teodata (Pavia)	freedom of movement for their vessel (*navem eorum*) on the Ticino	DD Lo I, 22
841	Lothar I	Church of Chur	Four vessels on the Walensee and tolls exemption	DD Lo I, 55
845	Lothar I	Novalesa Monastery	General freedom of movement (confirmation)	DD Lo I, 91
822-850	Lothar I	San Zeno (Verona)	Two vessels and tolls exemption along the Po, Adige and other rivers	DD Lo I, 184 (from DD Ber I, y. 893)
852	Louis II	Cremona (church)	Collection of the tenth part of salt carried on each *nave* from the coast in the port of Vulpariolo	DD L II, 4
852	Louis II	Genivolta (Church)	Concession of *navigia* along the Delma and Oglio rivers	*Codex Siccardi*, CDLM, 9; DD L II, 4
860-865	Louis II	San Colombano (Bobbio)	*Publicum transitum* along Po and Ticino for their *naves*	DD L II, 31; CDMB, 60; CDL, 218, 238
862	Louis II	San Colombano (Bobbio)	Port of Mantua: *venit ad nostrani partem XV navis; Veneticis navibus, unde debent venire solidos VI; De Comaclense nave venit sal modia VIII, denarios IIII;*	*Inventarii*, San Colombano; CDMB, 63
871	Louis II	Santa Maria Teodata (Pavia)	*Navem* in the port of Pavia	DD L II, 53

879-906	Berengar I	Santa Giulia (Brescia)	Piscilesso (BS): *naves VI unde veniunt in anno de sale modia XLII, solidos X*; Rivalta (RE): *naves III, inde venit in anno de sale modia XX*; Alfianello (BS): *naves III, unde venit sal modia XXX, denarios, XII*; San Daniele Po (BS): *de navis militorum veniunt in anno de sale modia XLVIII et solidos II cum denariis VIII*	*Inventarii*, Santa Giulia; CDLM, Santa Giulia, 46; CDL, 419
881	Charles III	Santa Maria Teodata (Pavia)	Freedom of *transitum* along Po and Ticino for *eorum naves*	DD Kar III, 45
880	Charles III	Doge Ursus (Venice)	Acces *cum nave* in the *fossa Gentionis*	DD Kar III, 17
880	Charles III	Parma	General freedom of movement and exemption along the Po	DD Kar III, 175 (15th c. Forged)
898-899	Berengar I	Santa Maria Teodata (Pavia)	Exemption for their naves in the ports of Pavia and *Buricum* and in the other ports	CDL, 378, 384

Tab. 3: *Fossae*/*Fossati*

Name/Place	Beneficiary	Source
Fossato (Picenengo, Due Miglia; Casale, Cremona; Cremona)	San Salvatore (Brescia)	CDL I, 107 CDL, 14
Fossa Munda (Nonantola?); *Fossa Mortua* (*Lupoleto*, Modena?); *Fossatum Finale* (*Canetulum* curtis, Finale Emilia?); *Fossa Quintana* (Modena?); *Fossam Lavaturiam* (Modena?); *Fossa Cararia*; *Fossa Firmana* (*Floriana-Albaretum*, Modena?); *Fossa Scavariorum* (Spino, RE); *Fossam Latam* (Fossalta, MO) *et Cambarionem*; *Fossa Carraria* (Modena?); *Fossatum* (free fish, Modena?)	San Silvestro (Nonantola)	CDL III/1, 32
Fossa (Santa Maria di Sesto?)	Santa Maria (Sesto)	CDL II, 241
Fossato (Brione, Valdichiana, Torino)	?	CDL II, 248
Fossa Scaveriola (Reggio Emilia); *Fossato de vico Bedullio* (?)	San Salvatore (Brescia)	CDB, 23 CDL, 45
Fossa Putratica (near Ravenna)	Church of Ravenna	DD K I, 314
Fossa Munda	San Silvestro (Nonantola)	*Placiti Perduti*: Nonantola
Fossa Firmana, *Vidola*; *Scavanorum* (?)	San Silvestro (Nonantola)	*Placiti*, 36
Fossatas	Sant'Ambrogio (Milan)	CDL, 113
Fossa Olobia; *Fossa Regiam* (Ostiglia)	San Zeno (Verona)	*Placiti*, 41; DD Lo I/II, 11; CDL, 108, 115;

839	*Fossa Caparia* (?); *Fossa Vissignone* (Fusina)	Santi Ilario e Benedetto (Venezia)	DD Lo I/II, 39
842	*Fossa Bruxola* (Mirandola); *Fossa Pauignana* (Pavignane); *Fossa Sclarola* (Raume, Pavignane);	San Silvestro (Nonantola)	DD Lo I/II, 141
845	*Fossa Lubiola* (close to the Po)	San Silvestro (Nonantola)	CDL, 157
856	*Fossato* (Milan)	Sant'Ambrogio (Milan)	CDL, 199
859	*Fossadoras* in *Tacianica* (Glassiate, MI)	Trade between privates	CDL, 204
862	*Fossato antico*; *Duas fossatus* (Cologno, MI)	Sant'Ambrogio (Milan)	CDL, 222
874	*Fossa Augusta* (Piacenza)	Santa Resurrezione (Piacenza)	DD L II, 85
879	*Fossato* in *Vico Blasonno* (Milan)	Ariprandus deacon	CDL, 290
880	*Frossa Metamauri* (Malamocco, VE) *Fossa Gentionis* (Venice?)	Doge Orso (Venezia)	DD K III, 17
884	*Fossato* (Cremona)	San Silvestro (Nonantola)	CDL, 324
885	*Fossato* (Cremona)	San Silvestro (Nonantola)	CDL, 332
896/898	*Fossato* near *Azo* (Milan)	Sant'Ambrogio (Milan)	CDL, 371
898	*Fossa Lavatura* (San Giovanni in Persiceto, BO)	San Silvestro (Nonantola)	*Placiti*, 106
899	*Fossas arborum in fundo Gausonasco* (Zavanasco Casarile, MI)	San Silvestro (Nonantola)	CDL, 383

Tab. 4: Carolingian *denarii* rescued in northern Italy

Grono (MesolcinaCH)	Charlemagne/Castel Seprio
Kloster St. Johann (Svizzera, Canton Grigioni, ma nel bacino dell'Adige)	Louis the Pious/Milan
Tremona (C.T.)	Lothar II/Milan
Bondeno (FE)	3 Charles/Milan 2 Charls/Pavia
Castel San Pietro Terme (BO)	Charlemagne, Sarzana type
Imola (BO), Villa Clelia	Louis/Ravenna
Rimini, Cattedrale, sarcofago di San Giuliano	Louis the Pious/Milan
Rimini, Palazzo Diotallevi	9^{th}-10^{th} c. Milan
Rosola (MO), Zocca	Venice/ante 840
Cividale del Friuli	Charles the Bold
Aquileia (UD)	Charlemagne or Charles the Bold/Melle Louis the Pious/Venice

11	Venzone (UD)	Charlemagne/Maastricht Charlemagne/Treviso Louis the Pious/Venice Louis the Pious/Milan
12	Brijuni (HR)	Charlemagne/Milan
13	Capodistria (SLO), Giardino dei Capuccini	Charlemagne
14	Colle del Melogno, loc.Pian dei Corsi (SV)	Charlemagne/Treviso
15	Luni (SP)	Louis the Pious, *christiana religio* type
	Luni (SP)	Charlemagne /Milan
16	Sarzana Luni (SP)	7 Charlemagne/Milan Charlemagne /Dorestadt Charlemagne/Magonza Charlemagne/Saint-Martin de Tour Charlemagne/Sens Charlemagne/RA
17	Bariano (BG)	Louis II/Milan
18	Bedizzole (BS)	Charlemagne
19	Brescia, Teatro romano	Charlemagne/Milano
20	Briosco (MI)	Charles the Fat
21	Carvico (BG), San Tomè	Charlemagne christiana religio type
22	Galliano, San Vincenzo (Cantù, CO)	Louis II/Milano
23	Lomello (PV)	Louis II/Milano
24	Lurate Abbate (CO)	4 Louis the Pious/Milan
25	Pavia, Strada Nuova-Via Calatafimi	360 Charles the Fat/Milan
26	San Bartolomeo di Castelaz - Valdisotto (SO)	Louis the Pious./Pavia
27	San Martino di Serravalle Valdisotto	Charles the Bold/Milan
28	Alba (CN), Piazza Risorgimento	2 9^{th}-10^{th} c.
29	Caraglio (CN), San Lorenzo	Lothar II (or I)/Pavia
30	Centallo (CN)	Louis II, Pavia or Venice
31	Oleggio (NO), San Michele	Louis II, *christiana religio* type
32	Pietramarazzi (AL), Loc. San Cuniforte	Charlemagne, *christiana religio* type
33	Torino, Piazza della Repubblica	Lothar/Pavia
	Torino, San Martiniano	not identified
34	Bolzano, Convento dei Cappuccini	Louis the Pious
35	Brixen/Bressanone, Rosslauf (BZ)	Pippin I Charlemagne/Milan Charlemagne/Pavia
36	Castelfondo (TN), Val di Non	Charlemagne/Milano
37	Levico (TN)	Charlemagne/Treviso
38	Pre Alta, Molina di Ledro (TN)	Charles the Fat Charles the Bold
39	Sanzeno, San Romedio (TN)	Pippin III
40	Aosta	Pippin I

41	Gran San Bernardo (AO)	Charlemagne/Verdun Charlemagne/Milan Lothar/Verdun Lothar/Duurstede Charles the Bold/Melle Louis the Pious/Milano 5 Louis the Pious/Saint Maurice d'Agaune
42	Adria (RO), Museo	Louis the Pious/Venice
43	Torcello (VE), Piazza	Charlemagne/Milan

From E.A. Arslan (ed.), *Repertorio dei ritrovamenti di moneta Altomedievale in Italia (489-1002)* (Spoleto 2005) update 2016 from http://ermannoarslan.it/repertori-e-approfondimenti/

Tab. 5: *Negotiatores* and markets active in the Po valley (8th-9th c.)

Negotiatiores

Name	Place	Source
Mercata etiam in propriis eiusdem ecclesie agris et terris licentiam habeatis et conducendi ibidem diversa mercimonia et negotiatores	Nonantola	CDL III/1, 26
Iohannis negociator (father of the witness of a donation)	Ravenna	Benericetti, *Le carte VIII-IX*, 4
Comaclenses (people from Comacchio)	*infra regnum nostrum ltalie*	CDL, 62
Dominici negotiatoris, *Johanni negotiatoris* (witnesses)	Milan	CDL, 69.
Dondoni negotiatoris, *Landepertus negotiator* (witnesses)	Pavia	CDL, 105.
negotiatoribus in quibus fuerit conservetur […] homines nostri licentiam habeant	Venetian territory	Pactum Lothar I,
Negotiator cum suis navibus in ipsum portum aplicat […] Comaclenses	Cremona	CDL, 180. DD Lo I, 116
Iohannes negociatore (among the men of Comachio)	Albarita and Portilione	Benericetti, *Le carte VIII-IX*, 19
Andrea negotiatore	Verona	DD Lu II, 13
Mauro negociator *Ursus negociator* (witnesses of the donation for the archbishop)	Ravenna territory	Benericetti, *Le carte VIII-IX*, 20.
Ianuarius	Brescia? Italy	CDL, 211.
Negociatoribus	Venezia territory	DD Kar III, 17
quidam Longobardorum vel aliarum gentium homines sua peragentes negotia	Cremona	CDL, 299.
Iohannis negociator (father of two witness of a donation)	Ravenna territory	Benericetti, *Le carte VIII-IX*, 34.
Simplicianus negociator de intra civitate Mediolania, qui professus sum legem vivere Langobardorumn	Nonantola	CDL, 333
Negocia autem partes liceat dare, quod Inter eos convenente vel invenire potuerint sine aliqua violentici aut contrarietate exceptis ab aliis, ita ut equa conditio utrarumque partium negociatoribus in quibus fuerant conservetur	Venetian territory	DD Ber I, 3
Urso negotiatur (witness)	Bologna	*ChLat* Piacenza VIII, 9

Urban and rural markets in the Po valley*

Place	Source
Nonantola territory	CDL III/I, 26
Nonantola territory	CDL III/I, 32
San Salvatore of Brescia's estates	CDL III/I, 44 CDLM, Santa Giulia, 22
Verona	CDL, 89
Piacenza	Falconi, Le carte S. Antonino di Piacenza, 5
Chiavenna	CDL, 104
Milano territory	CDL, 154
Along the Olio	CDL, 176
Along the Ticino-Po	Cipolla, S. Colombano, 60 CDL, 218
Along the Po	CDL, 224
San Colombano of Bobbio's estates	CDL, 238
Piacenza (Plectolis)	DD L II, 56
Lugano Como	CDL, 281
Piacenza (villa Plectola)	CDL, 300 DD Kar III, 35
Pasiliano Occimiano	Borello, Le Carte dell'Archivio Comunale di Biella, IV, 2.
Asti	Chartarum, II, 4. Assandria, Libro Verde della Chiesa d'Asti, II, 301
Santa Cristina di Corteolona	DD Kar III, 55
Rovescello	DD Ber I, 7
Guastalla *Luciaria*	Regesto Mantovano, 14
Sesto Calende	CDL, 357
Mantua territory	DD Ber I, 12
Piacenza	MGH, Arnolfi Diplomata, 142
Viguzzolo	Schiapparelli, DD Lambert, 7
Piacenza territory	DD Ber I, 37

*Realaboration from Rapone, *Il mercato*: 236-254

Tab. 6: Water rights

Usus aquarum, Usus Fluminibus

Year	Content	Location	Source
771	Andrea of Sirminone to Anselperga (and back)	*Locum Axegiatula* (Orgiano?) Sirmione Gosenago (MN)	CDL II, 257 [12th c. copy]
772	Adelchi to San Salvatore of Brescia	In all the *regnum*	CDLM, Santa Giulia, 22 CDL III/1, 44 CDL, 50
774	Totone for Peresendo	Campione (*in fundo Campelione*)	CDL, 53
801	Allerisso to Church Sant'Antonino (Piacenza bishopric)	Antognano (PC)	*ChLat* Piacenza V, 1
835	Cunegonda (king Bernard's widow) to Santa Maria and Sant'Alessandro of Parma	In the properties in the territories of Parma, Reggio and Modena	*ChLat* Parma II, 2
858	Alperto to Giselperga	Piacenza territory	*ChLat* Piacenza II, 3
862	Adremundus to Ioannis	Piacenza territory	*ChLat* Piacenza II, 5
865	Paolo, bishop of Piacenza, to Peredeo	Casale Grasiolo (Piacenza territory)	*ChLat* Piacenza VI, 17
871/872	Louis II for San Sisto of Piacenza	Padum (*usus aquarum omnem*)	DD L II, 79 [12th c. forged]
874	Iohannes and Traseverga to Leoperto	Casanova (Bardi, PR)	*ChLat* Piacenza VI, 27
875	Dagiverto to Gariprando deacon of Piacenza	Rugarolo (Nure valley) and Piacenza	*ChLat* Piacenza VI, 29
877	Rodelprando to Petrone, priest	Rugarolo (Nure valley), *Persoli*, Casanova (PC)	*ChLat* Piacenza VI, 39
878	Petrone to his wife Ragimperga	Niviano (PC) Lugagnano Val d'Arda (PC)	*ChLat* Piacenza II, 26
880	Charles III to San Michele Zena	On the Panaro and in the *curtis* of *Zena*	DD Kar III, 176 [14th c. forged]
881	Charles III to Petrus (cappellano)	*Susinade* (in Roncaglia)	DD Kar III, 37
891	Adreverga to her son Iohannes	Salsominore (PC)	*ChLat* Piacenza VII, 29
891	Madelbertus to the church of Piacenza	Guseliggio	*ChLat* Piacenza VII, 30
895	Liutprand and Antonino to Liutefred	Cassiano (PC)	*ChLat* Piacenza VIII, 5
897	Rodaldus archpriest to Rodelandus, priest, and his brother Andrea	*Casale Lacore*, *Aquabona*, on the river *Cene*	*ChLat* Piacenza VIII, 21
897	Luniverto and Placentina to Petrone, priest	Carmiano (PC)	*ChLat* Piacenza IV, 3

897	Petrus to Vitberto	In the territory of Piacenza: Niviano, Lugagnago, Macomero, Mignano, *Fabrica*	*ChLat* Piacenza IV, 4
898	Gumperga to Audase	In the territory of Piacenza: Levonti, Felegario, Popiano, Cisiano (GE)	*ChLat* Piacenza IV, 14
898	Matfred, priest, to the Church of Piacenza,	*Fontana Pradosa* (in the territory of Piacenza)	*ChLat* Piacenza VIII, 24
899	Adelbertus, Damianus diaconus, Ioannes divide their properties	*Argiliano* (in the territory of Piacenza)	*ChLat* Piacenza VIII, 30

Ripaticum

Year	Content	Location	Source
730	Capitulary of Liutprand	Parma	CDL III/1, 5
746	Rachis for Santi Antonio and Vittore in Piacenza (confirmation from Ildeprand)	Codaleto (Piacenza)	CDL III/1, 19
752	Astulf for San Silvestro (Nonantola)	Panaro, until Comacchio	CDL III/1, 26
759	Desiderio for Nonantola	*fluvii Boriane*	CDL III/1, 32
851	Louis II for the Church of Cremona	Cremona territory	DD L II, 1 CDL, 170
852	Louis II for the Church of Cremona	Cremona territory	CDL, 180
861	Louis II for Santa Giulia (Brescia)	Italian kingdom	DD L II, 32 CDL, 210
862/872	Louis II for San Sisto (Piacenza)	Po, Adda	DD L II, 80 [13th c. forged] CDL, 224
871/872	Louis II for San Sisto (Piacenza)	Po	DD L II, 79 [12th c. forged]
880	Charles III for the Venetians	In the whole kingdom	DD Kar III, 17
880	Charles III for Santa Cristina (Corteolona)	Corteolona estates	DD Kar III, 20 CDL, 282
881	Charles III for Santa Maria Teodata (Pavia)	Po, Ticino	DD Kar III, 45 CDL, 305
882	Charles III for Church of Reggio	In the whole kingdom (*per universa regni nostri spatial*)	DD Kar III, 47
883	Charles III for Venetians (Doge Johannes)	In the whole kingdom	DD Kar III, 77
885	Charles III for the Church of Asti	Bishopric estates	DD Kar III, 111
892	Guy for Santa Cristina (Corteolona)	Corteolona estates	Schiaparelli DD Guido, 15 CDL, 353
894	Berengar I for Egilulf, bishop of Mantua	*rippas et ripaticum et fixuras palorum ripe mantuane, civitatis et porti et insule Referis*	CDL, 363
896	Arnolf for San Sisto (Piacenza)	*Caput Trebium, Fagetum, Limidi*	DD Arn, 141

Tab. 7: ***Molinus/mulinus/molendinus/aquimolus***

Year	Location	Source
686	*Braidam Botariam*	CDL I, 9 (19th-c. Forged Dragoni)
710	Torre (TV)	CDL I, 14 (9th-c. copy)
712	Guastalla *Taterona*	CDL, 1
714	Near Pavia	CDL III/1, 11 (12th-c. Forged); CDL, 14
747	*Gambaro* (Ferriere, PC):	CDL III/1, 22; CDMB, 26 (10th c. Copy)
752	*Curte Panciano* (In the territory of Nonantola) Along the *Gena* river	CDL III/1, 26 (Forged)
753	Cremona and its territory	CDL I, 107 (11th-c. Copy)
762	Palazzolo sello Stella (UD) San Foca di Quirino (PN)	CDL II, 162
765	San Martino di Gusnago, fr. di Ceresara (MN), along the *Osone*	CDL II, 188; CDB, 12 (11th-c. Copy); CDL, 29
766	In the territory of Cremona	CDL II, 201 (Forged)
767	Outside the city of Brescia	CDL III/1, 39; CDB, 15 (10th c. Copy)
767	*Curte Locada* (along the Lambro)	CDL, 32
768	In the territory of Monza	CDL II, 218 (11th-c. Copy); CDL, 34
771	Along the Mincio	CDL II, 257; CDB, 23 (11th c. Copy); CDL, 43
772	Among the poperties of San Salvatore (Brescia)	CDL III/1, 44 (9th-c. Copy); CDL 50
774	Among the properties of the monastery of Novalesa	DD K I, 225 (12th-c. forged)
776	Lampugnano (MI)	CDL, 55
800-814	Along the Po and Olio rivers until the port of *Cavene*	DD K I, 316 (13th-c. forged)
819	Among the properties of the church of Piacenza	DD LdF, 157 (13th-c. copy)
822	Cittanova (MO)	DD LdF, 204
826	Biella (*in villa quae dicitur Bugella*)	*ChLat* Parma 2, 1
830	Near the abbey of San Pietro (PD) and Stra (VE)	CDP, 8 (14th-c. copy)
833-835	Near Bobbio (PC)	CDMB, 36 (11th-12th-c. copy)
835	In the territories of Parma, Reggio and Modena	Tiraboschi, *Memorie storiche modenesi*, 22
835	Along the Po *in loco ubi dicitur Sacca*; *Curtiliano* (perhaps the origin of the 11th c. Curtigliano, Pistoia?)	*ChLat* Parma 2, 2
836	Locate di Triulzi (MI)	DD Lo I, 29
837	In the estates of *Miliarinia, Cecuniaria, Rivariolas, Pisale, Piserissio, Campedello, Mantivado, Gatteriolo, Alfiano, Magonivico, Portiano, Novellaria, Cavomio, Goliano, Cervinica, Summolaco, Griliano, Cervopicto, Briciago*	Santa Giulia, CDLM, 26; DD Lo I, 35; CDL 130

839	*Curticella Platanum*	DD Lo I, 39 (15th-c. copy)
840	Among the properties of the monastery of Lucedio (Novara)	DD Lo I, 41
841	Near Chur	DD Lo I, 63
841	Near the port of Vulpariolo: *cum molitura de molendinis*	DD Lo I, 58; *Placiti, Inquisitiones* VII; CDL, 139, 153
841	Cologno (MI)	CDL, 142
844	*Carmiano* (In the territory of Piacenza?)	*ChLat* Piacenza 5, 30
848	In Valtellina	DD Lo I, 100
851	Near the port of Vulpariolo	DD L II, 1; CDL, 170
852	Port of Vulpariolo Along the Oglio probably near Genivolta (CR)	DD L II, 4; CDL, 176
853	*Vico Blateneim* Near Damiano, Monza (MI)	CDL, 183
861	Cassiano (PC), *casale Romani* (in the Nure valley)	*ChLat* Piacenza 6, 13
862	Near Cologno	CDL, 222
862-883	Travo (PC) Frassineto Po (AL) or Frassinara in Roncoferraro (MN) *Caniano* (in Valle Staffora in the territory of Varzi, PV) *Ulmeto* (perhaps Olmo, Gattatico, RE or Corte Brugnatella, PC)	*Inventarii*, San Colombano (862); CDMB, 63
863	Near Cologno along the Lambro	CDL, 226
864	Guastalla (RE) Luzzara (RE)	CDL, 231
865	Cologno (along the Lambro)	*Placiti*, 67; CDL, 234
866	In the territory of Padova	DD L II, 74 (18th-c. forged); CDP, 14
867	Near Cologno	CDL, 244
870/872	Suzzara (MN)	DD L II, 52; CDL, 254; Tiraboschi, *Memorie storiche modenesi*, 35
872	Along the Trebbia *in fundo et loco Lovenciassi*	*ChLat* Piacenza 2, 10
873	In the territory of Illasi (VR)	DD L II, 82 (14th-c. forged)
873	Quarto (FC) and In the territories of Imola, Forli, and Forlimpopoli	Benericetti, *Le carte VIII-IX,* 28
873	Pozzo Pagano (PC)	*ChLat* Piacenza 6, 25
873/874	Guastalla Luzzara	DD L II, 73
875	Riva del Garda (TN)	DD L II, 89 (12th-c. forged)
876	Along the Lambro	CDL, 248
878	Near the port of Vulpariolo	CDL, 275
878	*Magusiano* near Lonato (BS)	CDL, 277
878	Between Piacenza and its port	*ChLat* Parma 2, 23
878/9	In *casale Romani* (in the Nure valley, Cassiano)	*ChLat* Piacenza 7, 3

879-906	Piscilesso (BS), Rivalta (RE), Alfianello (BS), *In curte Griliano* (unknown, perhaps close to Corte Franca, BS), Borgonato, Corte Franca (BS), Odolo (BS), Porzano (BS), Volento (BS), Calcinato (BS) Cassivico, Corzano (BS), Nuvolera (BS), near Salo (BS), Rezzato (BS), Flero (BS), Mairano (BS), Movico near Corticello Pieve, Dello (BS), Sovere (BG), Clusone (BG), near Goito (MN), Marcaria (MN) *in curte Montevado* (unknown), Castiglione delle Stiviere (MN), *in curte Albinago* (unknown), *in curte Cigonaria* (near Viadana (MN), in the territory of Parma (not precisely indentifiable), Barbata (BG), *in loco que dicitur Zitolfa* (unknown)	*Inventarii*, Santa Giulia; CDLM, Santa Giulia, 46
879	Along the Lambro close to *sanctum Pancratium*	CDL, 290
880	*In curte Zena* (near Nonantola, along the Panaro)	DD K III, 176 (12th-c. forged)
880	In the *curtes* of: *de Monte, Berdedo*, *Dubin* (Between the territories of Lodi and Milan)	DD K III, 177 (12th-c. forged)
881	Near the port of Vulpariolo	CDL, 299
882	In the estates of *Regio*, *valle Cliui*, *Roueredo*, *Bugella*, *Sestinium*, *Romanianum*, *silvam rouasindam*, , *pontem Notingum*, *Trecade*, *Firminianam*, *Carixianam cum Langusco*, *Pasiliano* et *Occimiano* (in the territory of Vercelli)	DD L II, 54 (14th-c. forged)
882	In the territory of Piacenza	ChLat Piacenza 2, 38
883	Near the port of Vulpariolo	DD K III, 90; CDL, 323
883	In the territory of Cesarea (VE) and *Pladanum*	DD K III, 183 (15th-c. forged); CDP, 16
883	In *curte Seiadula* (in the territory of Nonantola) Lovertino (VI), Albettone (VI), Bagnolo (VI), Lonigo (VI), Costozza (VI), Longare (VI), *Villa, Passivale et Agna et Allo*	*Placiti Appendice*, 92bis
888	Among the properties of San Pietro (Cotrebbia) and San Sisto (Piacenza)	*ChLat* Parma 2, 32
890	*Corte Mercoriatico* (in the territory of Reggio)	Tiraboschi, *Memorie storiche modenesi*, 50
890	Outside the city walls of Piacenza along a canal	*ChLat* Parma 2, 34
891	Among the properties of the monastery of San Marino (PV)	Schiapparelli, *Guido*, 5; CDL, 347
891	Among the properties of monastery of the Queen (PV)	Schiapparelli, *Guido*, 7
891	Along the Po in the *curte Sexpile*	*Placiti*, 98 (13th- c. copy); CDL, 349
892	In the *curticellae* of Marnate (VA), Mozzate (CO) and *Rodeni* (PV)	Schiapparelli, *Guido*, 17
892	Among the properties of the bishop of Parma	*ChLat* Piacenza 7, 37
894	Among the properties of the bishop of Bergamo	CDL, 359
894	Among the properties of the bishop of Mantua	CDL, 363
894	In the territory of Forlimpopoli in *Caput Aquis*	Benericetti, *Le carte VIII-IX*, 50

895	In the *curticella* of Rivalta (RE)	Schiapparelli, *Lamberto*, 3; Tiraboschi, *Memorie storiche modenesi*, 52
895	Cassiano (PC)	*ChLat* Piacenza 8, 5
897	In the *curtis* of Sacco (PD).	CDP, 18
898	*Curtem Bellanium* (in the territory of Acqui Terme)	CDL, 381
9th-10th c.	Sparano (PV) *Mariano* (in Val Mozzola, RE) *Ulmeto* (Olmo, Gattatico, RE or Corte Brugnatella, PC)	CDMB, 76

Tab. 8: *Piscariae*, *piscationes*

Location	Source
Braidam Botariam	CDL I, 9 (19th-c. Forged Dragoni)
Villam Ticinum (Torre d'Isola, PV) Guastalla (RE) *Oviliam*	CDL, 1
Peschiera del Garda (VR)	CDL III/1, Bobbio, 5;
Sermide (MN) Bondeno (FE) *in finibus* of Reggio and Flexo	CDL III/1, 32
Riotorto (Pavullo, MO)	CDL, 33
Lonato (BS)	CDL, 52
Cittanova (MO) San Martino Spino (MO)?	DD K I, 131
Istria	CDI I, 54
Agnuzzo (CH)	DD LdF, 163
In the territories of Reggio and *Flexo*	*Placiti*, 36
Como	DD Lo I, 157
Fischina (Ragazzola, PR) or Diolo Fontanelle according to U.P. Censi, *Uomini e terre della cattedrale di Parma nel Medioevo* (Parma 2008): 1,15,19 nota 25.	*Placiti*, 40
Peschiera del Garda	DD Lo I, 11
Along the Po-Ticino	DD Lo II, 22
Boretto (RE) In the territories of Parma, Reggio and Modena	*ChLat* Parma 2, 2; Tiraboschi, *Memorie storiche modenesi*, 22
Lucedio (VC)?	DD Lo II, 41
Territory of Ravenna	Benericetti, *Le carte VIII-IX*, 29
Como	DD L II, 10
Cannobio (VB)?	CDL, 200
Como	CDL, 205
Peschiera del Garda (*piscaria facere*)	DD L II, 31; CDL, 218
Sarnico (BG)	DD L II, 33; CDL, 220
Port of Mantova In *summo laco* (Riva del Garda, TN)	*Inventarii*, San Colombano (862); CDMB, 63
Guastalla Luzzara	CDL, 231
In the territory of Padova	DD L II, 74 (18th-c. forged); CDP, 14

866	Sesto Cremonese (CR) Locarno (CH) (*alpibus piscariis*) Antignano (AT)	*ChLat* Parma 2, 10; DD L II, 46; CDL, 248
870	Suzzara	DD L II, 52; CDL, 254
872	Luzzara	Tiraboschi, *Memorie storiche modenesi*, 35
879	Suzzara	CDL, 280
879	Como	CDL, 281
879	Sirmione (VR)	CDL, 283
879-906	Iseo (BS) San Daniele Po (BS) Rivalta (RE): *et est lacus ad piscandum*	*Inventarii*, Santa Giulia; Santa Giulia, CDLM, 46
880	Suzzara	DD K III, 16; CDL, 293
880	Sirmione	DD K III, 28; CDL, 298
881	Along the Po	DD K III, 35
881	In *Caput Lacti* (in the territory of Piacenza)	DD K III, 45
882	In the territory of Reggio	DD K III, 47
883	Cittanova (VE) *Milidisce* (in the territory of Venice) Cavarzere (VE)	DD K III, 77
883	Suzzara	DD K III, 78; CDL, 317
887	Peschiera del Garda	CDL, 338
887	*Cremellina* (Vercurago)	CDL, 339
888	Among the properties of San Pietro (Cotrebbia, PC) and San Sisto (Piacenza)	*ChLat* Parma 2, 32
890	Corte Mercoriatico (Reggio territory)	
891	Among the properties of the monastery of the Queen in Pavia	CDL, 346
891	Among the properties of the monastery of San Martino in Pavia	CDL, 347
894	Among the properties of the church of San Vincenzo of Bergamo	CDL, 359
895	In the *curticella* of Rivalta (RE)	Schiapparelli, *Lamberto*, 3; Tiraboschi, *Memorie storiche modenesi*, 52
896	In the territory of Ravenna	Benericetti, *Le carte VIII-IX*, 54
897	In the *curtis* of Sacco (PD)	CDP, 18

Bibliography

Abbreviations

AF = F. Kurze (ed.), *Annales regni Francorum*, SRG 6 (Hannover 1895)

AnTard = Antiquité Tardive

ArchMed = Archeologia Medievale

Asser = A.S. Cook (ed.), *Asser's Life of King Alfred* (Boston 1906)

ASTSN A = Atti Della Società Toscana Di Scienze Naturali Residente In Pisa. Memorie. Serie A

CDLM = Codice Diplomatico della Lombardia Medievale (secoli VIII-XII)
http://www.lombardiabeniculturali.it/cdlm/

CDMB = Cipolla C.M., *Codice Diplomatico del monastero di S. Colombano di Bobbio fino all'anno 1208* (Rome 1918).

CDI I-V = P. Kandler, Codice Diplomatico Istriano (Trieste 1862-1865)
http://www.scriniumadriae.it/

CDL = L. Porro-Lambertenghi, *Codex Diplomaticus Langobardiae* (Torino 1873)

CDL I-V = L. Schiaparelli – C. Brühl, *Codice Diplomatico Longobardo* (Rome 1929-1986)

CDP = A. Gloria, Codice diplomatico padovano dal secolo sesto a tutto l'undicesimo (Venezia 1877)

CDV I-II = V. Fainelli, *Codice diplomatico Veronese. Dalla caduta dell'impero romano alla fine del periodo carolingio* (Venezia 1940-1963).

ChLat Parma I-II = *Chartae Latinae Antiquiores 2, 92-93 (Italy 64-65)*

ChLat Piacenza I-VIII = *Chartae Latinae Antiquiores 2, 64-71 (Italy 36-43)*

Cron. Ven. = John the Deacon, 'La Cronaca Veneziana', in G. Monticolo (ed.), *Cronache veneziane antichissime* (Rome 1890).

DD Ber I = L. Schiaparelli, *I Diplomi di Berengario I* (Rome 1903)

EHR = The Economic History Review

EME = Early Medieval Europe

HAM = Hortus Artium Medievalium

HL = Paul Deacon, *Historia Langobardorum,* SRG 48 (Hannover 1878)

Inventarii = A. Castagnetti *et al*. (eds.), *Inventari altomedievali di terre, coloni e redditi* (Rome 1979)

Istitutiones = Justinian*, Institutiones,* E. Huschke (ed.) (Leipzig 1867)

Le Leggi = C. Azzara – S. Gasparri (eds.), *Le leggi dei Longobardi. Storia, memoria e diritto di un popolo germanico* (Rome 2005)

Liber pontificalis = Agnellus Ravennas, *Liber pontificalis Ecclesiae Ravennatis*, D. Mauskopf-Deliyannis (ed.) (Turnhout 2006)

Liutprandi = *Liutprandi Leges*, in *Le Leggi*: 137-244.

McCormick = McCormick, *Origins*, Appendix 1: 799-810.

MGH = *Monumenta Germaniae Historica*

- Capit. I = *Capitularia regnum Francorum I*
- Capit. II = *Capitularia regnum Francorum II*
- DD Kar I = *Diplomata Pippin, Karlmann and Charlemagne*
- DD Kar III = *Diplomata Karl III*
- DD Kn = *Diplomata Karlsmanns*
- DD Lo I/Lo II = *Diplomata Lothar I and Lothar II*
- DD LdF = *Diplomata Ludwig der Fromme*
- DD L II = *Diplomata Ludwig II*
- DD MT = *Diplomata Mathilde of Tuszien*
- Epist. Karol. I = *Epistolae 3: Merowingici et Karolini aevi I*
- Epist. Karol. II = *Epistolae 4: Karolini aevi II*
- Poet. Karol. I = *Antiquitates: Poetae Latini aevi Carolini I*
- SS = *Scriptores*
- SAA = *Auctores Antiquissimi*
- SRG = *Scriptores rerum Germanicarum in usum scholarum*

NAVe = Notizie di Archeologia del Veneto

PBSR = Paper of the British School at Rome

PCA = European Journal of Post-Classical Archaeology

P&P = Past & Present

Placiti = C. Maranesi*, Placiti del Regnum Italiae I* (Rome 1955).

RM = Reti Medievali Rivista

Rothari = Edictum Rothari, in *Le Leggi*: 13-127.

QSAP = Quaderni della Soprintendenza archeologica del Piemonte

Settimane = Settimane di Studio del CISAM (Centro Italiano di Studi sull'Alto Medioevo)

Primary Sources

Agnellus Ravennas, *Liber pontificalis Ecclesiae Ravennatis*, D. Mauskopf-Deliyannis (ed.) (Turnhout 2006).

Allot S., *Alcuin of York, c. A.D. 732 to 804: his life and letters* (York 1974).

Ambrosius, *Epistolae*, O. Faller – M. Zelzer (eds.) (Wien 1968-1996).

Andrew of Bergamo, *Historia*, in L.A. Berto (ed.), *Italian Carolingian Historical and Poetic Texts* (Pisa 2016)

Annales Mettenses priores, SRG 10 (Hannover-Leipzig 1905).

Annales Regni Francorum, SRG 6 (Hannover 1895).

Annales Stadenses, SS 16 (Hannover 1859): 335.

Apollonius Rhodius, *Argonautica*, in W.H. Race (ed.) (Harvard 2008).

Azzara C. – Gasparri S. (eds.), *Le leggi dei Longobardi. Storia, memoria e diritto di un popolo germanico* (Rome 2005).

Barbieri E. *et al*., *Le carte del monastero di S. Giulia di Brescia I (759-1170)*, in CDLM.

Benericetti R.*, Le carte ravennati dei secoli VIII-IX* (Bologna 2006).

Benericetti R., *Le carte ravennati del secolo X* (Bologna 1999).

Biondo F., *Italy Illuminated I*, J.A. White (ed.) (Cambridge 2005).

Caesar, *De Bello Gallico*, H. Fuchs (ed.) (Frauenfeld 1944).

Cato, *Origines*, W.A. Schröder (ed.) (Meisenheim am Glan 1971).

Cato, *De Agricultura*, W.D. Hooper (ed.) (Harvard 1934).

Cassiodorus, *Variae*, L. Pellegrini (ed.) (Cosenza 2005).

Castagnetti A. *et al*. (eds.), *Inventari altomedievali di terre, coloni e redditi* (Rome 1979).

Catullus, *Carmina*, N. Holzberg (ed.) (Düsseldorf 2009).

Cipolla C.M., *Monumenta Novaliciensia I* (Rome 1898).

Cipolla C.M., *Codice Diplomatico del monastero di S. Colombano di Bobbio fino all'anno 1208* (Rome 1918).

Colombi E., '*Translatio Marci Evangelistae Venecias*', *Hagiographica* 17 (2010): 73-139.

Columella, *De re rustica*, E.S. Forster (ed.) (Harvard 2014).

Cook A.S. (ed.), *Asser's Life of King Alfred* (Boston 1906).

Duchesne L., *Le Liber Pontificalis I* (Paris 1886).

Dumville D. – Keynes S. (ed.), *Anglo-Saxon Chronicle: A Collaborative Edition I-V* (Cambridge 1986-2000).

Einhard*, Vita Karoli*, P. Chiesa (ed.) (Florence 2014).

Ennodius, *Magni Felicis Ennodi Opera*, SAA 7 (Weimar 1885).

Fainelli V., *Codice diplomatico Veronese. Dalla caduta dell'impero romano alla fine del periodo carolingio* (Venezia 1940).

Falconi E., *Le carte cremonesi dei secoli VIII-XII, I* (Cremona 1979).

Falconi E., *Le carte più antiche di S. Antonino di Piacenza (secoli VIII e IX)* (Piacenza 1959).

Fumagalli A., *Codice diplomatico santambrosiano* (Milan 1805, reprint in 1971).

Galetti P. – Petracco Sicardi G., *Le carte private della cattedrale di Piacenza* (Parma 1978).

Honorantie civitatis Papie, SS 30/2 (Leipzig 1934): 1444-1460.

Horace, *Carmina*, P. Shorey – G.J. Laing (eds.) (Chicago 1919).

Isidore of Seville, *Etymologiae*, S.A. Barney *et al*. (eds.) (Cambridge 2006).

John the Deacon, *Historia Veneticorum*, L.A. Berto (ed.) (Bologna 1999).

John the Deacon, 'La Cronaca Veneziana', in G. Monticolo (ed.), *Cronache veneziane antichissime* (Rome 1890): 58-171.

Jona of Bobbio, *Vita Columbani,* SRG 37 (Hannover-Leipzig 1905): 1-228.

Jordanes, *Getica*, SAA 5/1 (Weimar 1882)

Justinian*, Institutiones,* E. Huschke (ed.) (Leipzig 1867).

Laudes Mediolanenis Civitatis, in G.B. Pighi (ed.), *Versum*.

Laudes Veronensis Civitatis, in G.B. Pighi (ed.), *Versum*.

Leoni V. (ed.), *Privilegia episcopii Cremonensis o Codice di Siccardo (715/730 - 1331)*, in *CDLM*.

Liutprand of Cremona, Antapodosis, P. Chiesa (ed.) (Turnhout 1998).

Liutprand of Cremona, Historia Ottonis, P. Chiesa (ed.) (Turnhout 1998).

Lucan, *Pharsalia*, J.D. Duff (ed.) (Cambridge 1928).

Maranesi C., *I Placiti del Regnum Italiae I* (Rome 1955).

Martial, *Epigrams*, D.R. Shackleton Bailey (ed.) (Harvard 1993).

Marzola I., *Le carte ferraresi più importanti anteriori al 1117* (Città del Vaticano 1983).

Mezzetti C., *Le carte dell'archivio di Santa Maria di Pomposa (932-1050)* (Rome 2016).

Muratori L.A., *Antiquitates Italicae Medii Aevi II/XXI* (Milan 1739).

Palladius, *Opus Agriculturae*, J.G. Fitch (ed.) (Totnes 2013).

Pighi G.B. (ed.), *Versum de Verona, Versum de Mediolano Civitate. Studi pubblicati dell'Istituto di Filologia Classica VII* (Bologna 1960).

Pliny the Elder, *Naturalis Historia*, J. Healey (ed.) (London 1991).

Polybius, *Histories*, W.R. Paton (ed.) (Harvard 1922-1927).

Porro-Lambertenghi L., *Codex Diplomaticus Langobardiae* (Torino 1873)

Schiaparelli L., *I Diplomi di Guido e Lamberto* (Rome 1906).

Schiaparelli L. – Brühl C., *Codice Diplomatico Longobardo* (Rome 1929-1986).

Strabo, *Geographica*, S. Radt (ed.) (Göttingen 2002–2011).

Schwab I. (ed.), *Das Prümer Urbar* (Düsseldorf 1983).

Tacitus, *Agricola*, A.J. Woodman – C.S. Kraus (eds.) (Cambridge 2014).

Tiraboschi G., *Memorie storiche modenesi* (Modena 1793).

Titus Livy, *Ab Urbe Condita*, C. Shuttleworth Kraus (ed.) (Cambridge 1994).

Translatio et miracula sanctorum Senesii et Theopontii, SS 30/2: 984-992

Varro, *Rerum rusticarum libri*, L. Storr-Best (ed.) (London 1912).

Virgil, *Aeneid*, T. Williams (ed.) (Boston 1910).

Vitruvius, *De Architectura*, M.H. Morgan (Cambridge 1914).

Weber E., *Tabula Peutingeriana. Codex Vindobonensis 324* (Gratz 1976).

Secondary Sources

Accorsi C.A., Bandini Mazzanti M., Forlani L., Mercuri A.M., Trevisan Grandi G., 'An overview of Holocene forest pollen flora/vegetation of the Emilia-Romagna region-northern Italy', *Archivio Geobotanico* 5 (1999): 3-27.

Agnoletti M. (ed.), *Paesaggi rurali storici. Per un catalogo nazionale* (Roma-Bari 2011).

Alberti A., 'Produzione e commercializzazione della pietra ollare in Italia settentrionale tra tardoantico e altomedioevo', in Gelichi (ed.), *I Congresso*: 335-339.

Alberti *et al*., 'La vita quotidiana dei monaci', in Gelichi *et al.* (eds.), *Nonantola 6*: 181-278.

Albertoni G., 'La politica alpina dei Carolingi', in *Carlo Magno e le Alpi: Atti del XVIII Congresso internazionale di studi sull'alto medioevo* (Spoleto 2007): 49-74.

Alfieri N. (ed.), *Insediamenti nel Ferrarese. Dall'età romana alla fondazione della Cattedrale* (Florence 1976).

Alfieri N., 'La chiesa in S. Maria in Padovetere nella zona archeologica di Spina', *Felix Ravenna III* 43 (1966): 5-51.

Ambrosini C. – De Marchi P.M. (eds.), *Uomini e acque a San Benedetto Po. Il governo del territorio tra passato e futuro* (Florence 2010).

Andenna G. *et al.* (eds.), *Le origini della diocesi di Mantova e le sedi episcopali dell'Italia settentrionale (IV - XI secolo)* (Trieste 2006).

Andreolli B., 'Gestione e misurazione dell'acqua nell'alto medioevo', in *Settimane* 55 (2008): 429-466.

Andreolli B., 'Paesaggi della vite e paesaggi dell'olivo nell'Italia dell'alto medioevo', *Settimane* 54 (2007): 317-358.

Andreolli B., *Contadini su terre di signori. Studi sulla contrattualistica agraria dell'Italia medievale* (Bologna, 1999): 221-227.

Andreolli B., 'Il sistema curtense nonantolano e il regime delle acque', in F. Serafini – A. Manicardi (eds.), *Il sistema fluviale*: 91-94.

Andreolli B., 'Formule di pertinenza e paesaggio', *Rivista di archeologia, storia, economia e costume* 5 (1977): 7-18.

Andreolli B. *et al.* (eds.), *Le campagne italiane prima e dopo il Mille. Una società in trasformazione* (Bologna, 1985).

Andreolli B. – Mantovani G. (eds.), *Gavello e San. Martino Spino. Storia di una valle di bassa pianura* (Mantova 1993).

Andreolli B. – Montanari M., *L'azienda curtense in Italia. Proprietà della terra e lavoro contadino nei secoli VIII-XI* (Bologna 1983).

Andreolli B. – Montanari M. (eds.), *Il bosco nel Medioevo* (Bologna 1988).

Anno 413. Nascita di Ferrara? Astrologia e Storia alle Origini della Città, in *Supplemento Atti dell'Accademia delle Scienze di Ferrara* 91 (2013-2014).

Antonini A., *Architettura in terra e legno in Italia Settentrionale dell'età Romana al Medioevo. La trasmissione dei saperi*, PhD Thesis (Politecnico Milan 2014).

Ardizzone G.D. *et al*., *Management of coastal lagoon fisheries and aquaculture in Italy* (Rome 1988).

Arnold E.F., 'Engineering Miracles: Water Control, Conversion and the Creation of a Religious Landscape in the Medieval Ardennes', *Environment and History* 13 (2007): 477-502.

Arnoux M., 'Les moulins à eau en Europe occidentale (IXe-XIIe siècles). Aux origines d'une économie institutionnelle de l'énergie hydraulique', *Settimane* 55 (2008): 693-746

Arrivabene G., *Dizionario domestico* (Brescia 1809).

Arthur P. – Patterson H., 'Ceramics and early medieval central and southern Italy: a potted history', in Francovich – Noyé (eds.), *La storia*: 409-441.

Atsma H. (ed.), *La Neustrie. Les pays au nord de la Loire de 650 à 850* (Sigmaringen 1989).

Atzbach R. *et al*. (eds.), *Archäologie, Mittelalter, Neuzeit, Zukunft: Festschrift für Ingolf Ericsson* (Bonn 2017).

Augenti A. *et al*., 'Insediamenti e organizzazione del territorio in Romagna (secoli X-XIV)', in *Archeologia Medievale* 37 (2010): 61-92.

Augenti A. (ed.), *Le città italiane tra la tarda antichità e l'alto Medioevo* (Florence 2006).

Azzara C., 'Il re e il monastero. Desiderio e la fondazione di Leno', in A. Baronio (ed.), *L'abbazia*: 21-32.

Azzara C., 'Chiese e istituzioni rurali nelle fonti scritte di VII e VIII secolo: problemi storici e prospettiva di ricerca', in G.P. Brogiolo (ed.), *Le chiese*: 9-16.

Baker P., 'Assessment of animal bones excavated in 2004-2005 at Nogara', in F. Saggioro (ed.), *Nogara*: 107-121.

Baker P., 'The animal bones from Strs. II-VII: subsidence, husbandry and status', in Brogiolo – Castelletti (eds.), *Archeologia a Monte Barro II*: 249-268.

Baker P., *Society and Economy in Northern Italy in the Early Medieval Period (c. 8th-11th). A Zooarchaeology Study*, PhD Thesis (University College London 2000).

Baker P., 'The vertebrate remains from the Longobard and 9th-10th C. occupation at S. Giulia, Brescia', in Brogiolo (ed.), S*. Giulia di Brescia*: 425-449.

Baker P., 'A preliminary assessment of the role of hunting in Early Medieval subsistence in the Alpine, Prealpine and Lowland areas of northern Italy on the basis of zooarchaeological data', in Biagi – Nandris (eds.), *Highland Zone Exploitation*: 307-315.

Baker P., 'Fauna', in Brogiolo – Castelletti (eds.), *Archeologia a Monte Barro I*, 153-167.

Balzaretti R., *The Land of Saint Ambrose: Monks and Society in Early Medieval Milan* (Turnhout 2019).

Balzaretti R., 'Chestnuts in charters: evidence for specialised production in early medieval Genoa and Milan', in Balzaretti *et al*. (eds.), *Italy*: 356-371.

Balzaretti R., 'Monasteries, Towns and the Countryside: Reciprocal Relationships in the Archdiocese of Milan, 614-814', in G.P. Brogiolo, N. Gauthier, N. Christie (eds.), *Towns and their territories*: 235-258.

Balzaretti R., 'Cities, Emporia and Monasteries: Local Economies in the Po Valley, c. AD 700-875', in Christie – Loseby (eds.), *Towns in transition*: 213-234.

Balzaretti R., 'The Curtis: archaeology of sites of power', in Francovich – Noyé (eds.), *La storia*: 99-108.

Balzaretti R. *et al*. (eds.), *Italy and Early Medieval Europe: Papers for Chris Wickham* (Oxford 2018).

Baroni G., 'L 'Adda e il traffico del sale', *Archivio Storico di Lodi* 48 (1929): 153-164.

Baronio A., 'Tra corti e fiume: l'Oglio e le «curtes» del monastero di S. Salvatore di Brescia nei secoli VIII-X', in C. Boroni *et al*. (eds.), *Rive e rivali:* 11-74.

Baronio A. (ed.), *L'abbazia di San Benedetto di Leno. Mille anni nel cuore della Pianura Padana* (Brescia 2002).

Barrett J.H. – Orton D.C. (eds.), *Cod and Herring. The archaeology and history of medieval sea fishing* (Oxford-Philadelphia 2016).

Bartolomei G. *et al*. 'Studio geologico coordinato per la pianificazione territoriale del Comune di Ferrara', *Memorie Società Geologica Italiana* 14 (1975): 165–205.

Basso P. – Grazioli V., 'Indagini archeologiche a Gazzo Veronese lungo la strada Romana nota come Claudia Augusta Padana', *Archeologia Veneta* 38 (2015): 63-79.

Beaudoulin F., *Les bateaux garonnais. Essai de nautique fluviale* (Conflans-Sainte-Honorine 2000).

Bellini L., *Le saline dell'antico Delta padano* (Ferrara 1962).

Benoit P. – Wabont M., 'Mittelalterliche Wasserversorgung in Frankreich. Eine Fallstudie: Die Zisterzienser', in *Die Wasserversorgung*: 185-226

Bergamaschi A.G., 'Attività commerciali e privilegi fluviali padani del Monastero di S. Colombano di Bobbio', *Archivio Storico Lombardo* 89 (1962): 48-61.

Bergamo M. *et al*., 'Il monastero e le attività produttive', in Gelichi *et al.* (eds.), *Nonantola 6*: 137–180.

Berti F. *et al.* (eds.), *Genti nel delta da Spina a Comacchio. Uomini, territorio e culto dall'Antichità all'Alto Medioevo* (Ferrara 2007).

Berti F. *et al*. (eds.), *Bondeno e il suo territorio dalle origini al Rinascimento* (Casalecchio di Reno 1988).

Bertuzzi G. (ed.), *Viabilità antica e medievale nel territorio modenese e reggiano. Contributi di studio* (Modena 1983).

Biagi P. – Nandris J. (eds.), *Highland Zone Exploitation in Southern Europe*, *Monografie di Natura Bresciana* 20 (1994).

Bianchi G., 'Building, inhabiting and «perceiving» private houses in early medieval Italy', *Arqueología de la arquitectura* 9 (2012): 195 – 212.

Biddle M., 'Towns', in D.M. Wilson (ed.), *The archaeology of Anglo-Saxon England* (Cambridge 1976): 99–150.

Biscaro G., 'Gli antichi navigli milanesi', *Archivio Storico Lombardo* 10/20 (1908): 285-324.

Blake H. (ed.), *Archeologia urbana a Pavia* (Pavia 1995).

Bloch M., 'Avènement et conquêtes du moulin à eau', *Annales d'historie économique et sociale* 7 (1935): 136-168.

Bloch M., *Les caractères originaux de l'histoire rurale française I* (Paris 1931).

Bocchi F., *Note di storia urbanistica ferrarese nell'alto medioevo* (Ferrara 1974).

Bocchi F., 'Ferrara, una città fra due vocazioni: urbanistica e storia da piazzaforte militare a centro commerciale', in N. Alfieri (ed.), *Insediamenti nel Ferrarese*: 125-152.

Bognetti G.P., 'La navigazione Padana e il sopravvivere della civiltà antica', in *Archivio storico lombardo* 89 (1964): 5-16.

Bognetti G.P., 'S. Maria Foris Portas di Castelseprio e la storia religiosa dei Longobardi', in G.P. Bognetti *et al*., *Santa Maria di Castelseprio*: 11–511.

Bognetti G.P. *et al*., *Santa Maria di Castelseprio* (Milan 1948).

Boldrini E. – Francovich R. (eds.), *Acculturazione e mutamenti. Prospettive nell'Archeologia medievale del Mediterraneo* (Florence 1995).

Bonacini P., *Terre d'Emilia: distretti pubblici, comunità locali e poteri signorili nell'esperienza di una regione italiana (secoli VIII - XII)* (Bologna 2001).

Bonacini P., 'Conti, vescovi, abati. Potere civile e immunità ecclesiastiche nel territorio modenese dell'alto Medioevo', in *Studi Medievali* 37 (1989): 823–837.

Bonacini P., 'Autorità civile e potere episcopale a Cittanova tra l'VIII e il X secolo. Formazione e sviluppo dell'insediamento nell'Alto Medioevo', in A. Cardarelli *et al*. (eds.), *Modena*: 595–599.

Bond J., 'Production and Consumption of Food and Drink in the Medieval Monastery', in G. Keevil *et al*. (eds.), *Monastic Archaeology*: 54-87.

Bondesan M., 'L'evoluzione idrografica e ambientale della pianura ferrarese negli ultimi 3000 anni', in A. Broglio – M. Bondesan, *Storia di Ferrara I*: 227-263.

Bondesan M., 'Origine ed evoluzione della geologica della Pianura Padana e del territorio ferrarese', in A. Broglio – M. Bondesan, *Storia di Ferrara I*: 17-39.

Bondesan M. – Giovannini A., 'Evoluzione Geomorfologica della pianura costiera fra Codigoro e Comacchio (Ferrara)', *Annali dell'Università di Ferrara. Scienze della Terra* 5/3 (1994): 27-38.

Bondesan M., Favero V., Viñals M.J., 'New evidence on the evolution of the Po-delta coastal plain during the Holocene', *Quaternary International* 29/30 (1995): 105-110.

Borelli G. (ed.), *Una città e il suo fiume. Verona e l'Adige I-II* (Verona 1977).

Boroni C. *et al*. (eds.), *Rive e rivali. Il fiume Oglio e il suo territorio* (Roccafranca 1999).

Bosco M. *et al*., 'Note sulla sequenza delle campagne di scavo 2014-2017 presso il sito di S. Benedetto di Leno (BS)', in F. Sogliani *et al*. (eds.), *VIII Congresso*: 22 –25.

Bosi G. *et al.*, 'A survey of the Late Roman period (3rd-6th century AD): Pollen, NPPs and seeds/fruits for reconstructing environmental and cultural changes after the floods in Northern Italy', *Quaternary International* 499 (2019): 3-23.

Bosi G. *et al.*, 'Seeds/fruits, pollen and parasite remains as evidence of site function: piazza Garibaldi – Parma (N Italy) in Roman and Medieval times', *Journal of Archaeological Science* 38 (2011): 1621-1633.

Botalla Buscaglia N., *Materiali in ceramica e pietra ollare nel Vercellese tra tardoantico e altomedioevo. Caratteristiche produttive e distributive per uno studio integrato del territorio*, PhD Thesis (Sapienza University of Rome 2013).

Bottazzi G., 'Le comunicazioni antiche fra il Modenese e la Toscana in età Romana e nel medioevo', in P. Foschi *et al*. (eds.), *La viabilità appenninica*: 47-78.

Bougard F., 'Adalhard de Corbie entre Nonantola at Brescia (813): *Commutatio*, gestion des biens Monastiques et marché de la terre', in E. Cuozzo *et al*. (eds.), *Puer Apuliae*: 51-68.

Bradbee C., 'Imprints: the history of water management and canals in Piacenza, Italy', *Urban History* 44/2 (2017): 188-207.

Braudel F., 'Pre-modern towns', in P. Clark (ed.), *Town*: 53-90.

Braudel F., *Civilisation matérielle et capitalisme I* (Paris 1967).

Braudel F., *La Méditerranée et le monde méditerranéen à l'époque de Philippe II* (Paris 1949).

Breda A., 'Leno. Monastero e territorio. Note archeologiche preliminari', in A. Baronio (ed.), *L'abbazia di San Benedetto di Leno*: 239-254.

Brogiolo G.P., 'Insediamenti, chiese e porti lungo il basso Adige tra VI e X secolo', *HAM* 22 (2016): 417-430.

Brogiolo G.P., 'Flooding in Northern Italy during the Early Middle Ages: resilience and adaptation', *PCA* 5 (2015): 47–68.

Brogiolo G.P., 'Evoluzione in età longobarda di alcuni castelli dell'Italia settentrionale', in E. Boldrini – R. Francovich (eds.), *Acculturazione e mutamenti*: 191–200.

Brogiolo G.P., *Brescia altomedievale. Urbanistica ed edilizia dal IV al IX secolo* (Mantova 1993).

Brogiolo G.P., 'Le campagne dalla tarda antichità al 900 ca. d.C.', *ArchMed* 10 (1983): 89-110.

Brogiolo G.P. (ed.), *Chiese e insediamenti nelle campagne tra V e VI secolo* (Mantova 2003).

Brogiolo G.P. (ed.), *Le chiese rurali tra VII e VIII secolo in Italia settentrionale* (Mantova 2001).

Brogiolo G.P. (ed.), *II Congresso Nazionale di Archeologia Medievale* (Florence 2000).

Brogiolo G.P. (ed.), *Le fortificazioni del Garda e i sistemi di difesa dell'Italia settentrionale tra tardo antico e alto medioevo* (Mantova 1999).

Brogiolo G.P. (ed.), S*. Giulia di Brescia, gli scavi dal 1980 al 1992* (Florence 1999).

Brogiolo G.P. (ed.), *Early medieval towns in the Western Mediterranean. Ravello, 22-24 September 1994* (Mantova 1996).

Brogiolo G.P. – Castelletti L. (eds.), *Archeologia a Monte Barro, II, Gli scavi 1990-1997 e le ricerche al S. Martino di Lecco* (Como-Lecco 2001).

Brogiolo G.P. – Castelletti L. (eds.), *Archeologia a Monte Barro, I, Il grande edificio e le torri* (Lecco 1991).

Brogiolo G.P. – Chavarría Arnau A. (eds.), *Archeologia e società tra tardo antico e alto Medioevo* (Mantova 2007).

Brogiolo G.P. – Chavarría Arnau A. (eds.), *Aristocrazie e campagne nell'occidente da Costantino a Carlo Magno* (Florence 2005).

Brogiolo G.P. *et al*. (eds.), *Dopo la fine delle ville: le campagne dal V al IX secolo* (Florence 2005).

Brogiolo G.P., Gauthier N., Christie N. (eds.), *Towns and their territories between Late Antiquity and the Early Middle Ages* (Leiden 2000).

Brogiolo G.P. – Gelichi S., *La città nell'alto medioevo italiano* (Rome-Bari 1998).

Brogiolo G.P. – Gelichi S., 'La ceramica grezza medievale nella pianura padana', in *La ceramica medievale*: 293-316

Brogiolo G.P. – Mancassola N. (eds.), 'Scavi al Castello di Piadena', in S. Gelichi (ed.), *Campagne medievali*: 121–220.

Broglio A. – Bondesan M., *Storia di Ferrara I* (Ferrara 2001).

Bruand O., 'Pénétration et circulation du sel de l'Atlantique en France septentrionale (VIIIe-XIe siècles)', *Annales de Bretagne et des Pays de l'Ouest* 115/3 (2008): 7-32.

Bruand O., *Voyageurs et marchandises aux temps carolingiens: les réseaux de communication entre Loire et Meuse aux VIIIe et IXe siècles* (Bruxelles 2002).

Brugnoli A. *et al*., '"Villaggi" e strutture dell'insediamento in territorio veronese tra IX e XII secolo', in P. Galetti (ed.), *Villaggi, comunità, paesaggi*: 361-394.

Bruno B. – Giostra C., 'Il territorio di Povegliano Veronese fra tarda antichità e alto medioevo, nuovi dati e prime riflessioni', in F. Redi – A. Forgione (eds.), *VI Congresso*: 216-222.

Bullough D.A., 'Urban Change in Early Medieval Italy. The Example of Pavia', *PBSR* 34 (1966): 82–130.

Büntgen U. *et al*., 'Cooling and societal change during the Late Antique Little Ice Age from 536 to around 660 AD', *Nature Geoscience* 9 (2016): 231-236.

Büntgen U. *et al*., '2500 Years of European Climate Variability and Human Susceptibility', *Science* 331 (2011): 578-582.

Burnouf J., 'Towns and rivers, river towns: environmental archaeology and the archaeological evaluation of urban activities and trade', in J. Henning (ed.), *Post-Roman towns*: 165-180.

Busana M.S., 'Fishing, fish farming and fish processing during the Roman age in the Northern Adriatic: Literary sources and archaeological data', *Regional Studies in Marine Science* 21 (2018): 7-16.

Calaon D., 'Lo scavo di Villaggio San Francesco', in F. Berti *et al*. (eds.), *Genti nel delta*: 505-530.

Calaon D. *et al*. (eds.), *Torcello Scavata. Lo scavo 2012-2013,* (Venezia 2013).

Calzolari M., *Il Po in età Romana. Geografia, storia e immagine di un grande fiume europeo* (Reggio Emilia 2004).

Calzolari M., 'Navigazione interna, porti e navi nella pianura reggiana e modenese (secoli IX-XII)', in G. Bertuzzi (ed.), *Viabilità*: 124–132.

Camenisch C. *et al*., 'The early Spöre Minimum – a period of extraordinary climate and socio-economic changes in Western and Central Europe', *Climate of the Past Discussions* 12/11 (2016): 1-33.

Campopiano M., 'Rural communities, land clearance and water management in the Po Valley in the central and late Middle Ages', *Journal of Medieval History* 39/4 (2013): 377-393.

Campopiano M., 'The evolution of landscape and the social and political organisation of water management: the Po Valley in the Middle Ages (fifth to fourteenth centuries)', in E. Thoen *et al*. (eds.), *Landscapes or seascapes?* (Turnhout 2013): 313-332.

Campopiano M. – Menant F., 'Agricolture irrigue: l'Italia padana', in *I paesaggi agrari d'Europa*: 291-322.

Camuffo D., 'Freezing of the Venetian Lagoon since the 9th century A.D. in comparison to the climate of western Europe and England', *Climatic Change* 10 (1987): 43-66.

Canal E., 'La Venezia sommersa: quarant'anni di archeologia lagunare', in G. Caniato *et al*. (eds.) *La laguna*: 193-225.

Caniato G.*et al*. (eds.) *La laguna di Venezia* (Verona 1995).

Cantini F., 'Produzioni ceramiche ed economie in Italia centro-settentrionale', in Valenti – Wickham (eds.), *Italy, 888-962*: 341-363.

Cantino Wataghin G., 'Strade e luoghi di strada', in *Carlo Magno e le Alpi: Atti del XVIII Congresso internazionale di studi sull'alto medioevo* (Spoleto 2007): 269-298.

Cantoini G. – Capurso A. (eds.), *On the road. Via Emilia 187 AC – 2017* (Parma 2017).

Canzian D. – Simonetti R. (eds.), *Acque e territorio nel Veneto medievale* (Rome 2012).

Carannante A. *et al*., 'Le cucine di San Vincenzo al Volturno. Ricostruzione funzionale in base ai dati topografici, strutturali, bioarcheologici e chimici', in F. De Rubeis – F. Marazzi (eds.), *Monasteri in Europa*: 489-507.

Cardarelli A. – Malnati A. (eds.), *Atlante dei beni Archeologici della Provincia di Modena I: Pianura* (Florence 2003).

Cardarelli A. *et al*. (eds.), *Modena dalle origini all'anno mille. Studi di archeologia e storia I* (Modena 1989).

Carlo Magno e le Alpi: Atti del XVIII Congresso internazionale di studi sull'alto medioevo (Spoleto 2007).

Carus-Wilson E., 'An Industrial Revolution of the Thirteenth Century', *EHR* 11 (1941): 39-60.

Castagnetti A., 'La storia agraria dell'Alto Medioevo nel Novecento fino ai primi contributi di Vito Fumagalli (1966-1971)', in P. Nanni (ed.), *Agricoltura e ambiente*: 41-65.

Castagnetti A., 'Le origini di Nogara (906) fra il re Berengario, il diacono veronese Audiberto, il conte Anselmo e il monastero di Nonantola', in F. Saggioro (ed.), *Nogara*: 1-50.

Castagnetti A., *Società e politica a Ferrara dall'età postcarolingia alla signoria estense (secoli X-XIII)* (Bologna 1985).

Castagnetti A., *L'organizzazione del territorio rurale nel medioevo. Circoscrizioni ecclesiastiche e civili nella "Langobardia" e nella "Romania"* (Torino 1979).

Castagnetti A., 'La pianura veronese nel medioevo. La conquista del suolo e la regolamentazione delle acque', in G. Borelli (ed.), *Una città e il suo fiume I*: 33-138.

Castaldini D., 'Evoluzione della rete idrografica centropadana in epoca protostorica e storica', in *Insediamenti e viabilità nell'alto ferrarese*: 115-134.

Castiglioni E. – Rottoli M., 'Brescian archaeobotanical studies, Romanization to Early Medieval periods', *PCA* 8 (2018): 91-116.

Castiglioni E. – Rottoli M., 'Coltivazioni ed uso del legno in Valtellina dalla protostoria all'età moderna: i dati archeobotanici di Sondrio, Teglio e Bormio, e Analisi archeobotaniche, schede', in V. Mariotti (ed.), *La Valtellina*: 909-936.

Castiglioni E. – Rottoli M., 'I semi e i frutti delle dispense', in B. Grassi – C. Miedico (eds.), *Il profumo*: 41-54.

Castiglioni E. – Rottoli M., 'Broomcorn millet, foxtail millet and sorghum in northern Italian Early Medieval sites', *PCA* 3 (2013): 131-144.

Castiglioni E. – Rottoli M., 'Miglio, panico e sorgo nei siti altomedievali dell'Italia settentrionale', *Atti del Convegno AIAr* 7 (2012): 250-263.

Castiglioni G.B., 'Geomorphology of the Po Plain', *Suppl. Geografia Fisica e Dinamica Quaternaria* 3/3 (1999): 10-11.

Castiglioni G.B. (ed.), *Carta Geomorfologica delle Pianura Padana* (Florence 1997).

Cattani M., Marchesini M., Marvelli S. (eds.), *Paesaggio ed economia nell'età del Bronzo: la pianura Bolognese tre Samoggia e Panaro* (Bologna 2010).

Cera G., *La via Postumia da Genova a Cremona* (Rome 2000).

Chabin J.P. (ed.), *La forêt dans tous ses états: de la Préhistoire à nos jours* (Besançon 2003).

Champion E., *Moulins et meuniers carolingiens dans les polyptiques entre Loire et Rhin* (Paris 1996).

Chavarría A. – Crosato A., 'Chiese rurali nel mantovano tra tardo antico e altomedioevo', in G. Andenna *et al.* (eds.), *Le origini della diocesi*: 383-419.

Chavarría Arnau A. – Crosato A., 'La cristianizzazione del territorio mantovano tra Tardoantico ed Altomedioevo', in C. Ambrosini – P.M. De Marchi (eds.), *Uomini e acque*: 37-42.

Cheyette F.L., 'Settlement, Taxation and the Condition of the Peasantry in Post-Roman Central Italy', *EME* 16 (2008): 127-165.

Chevalier R., *Les voies Romaines* (Paris 1997).

Chevalier R., *Geografia, archeologia e storia della Gallia Cisalpina. Il quadro geografico* (Torino 1988) [first ed. *La Romanisation de la Celtique du Pô. Géographie, archéologie et histoire en Cisalpine, I: Les donnes géographiques* (Paris 1980)].

Chiabà M. (ed.), *Miscellanea di studi dedicata a Gino Bandelli* (Trieste 2014).

Christie N., *From Constantine to Charlemagne: An Archaeology of Italy AD 300–800* (Aldershot 2006).

Christie N. – Loseby S.T. (eds.), *Towns in Transition: Urban Evolution in Late Antiquity and the Early Middle Ages* (Aldershot 1996).

Cianciosi A. *et al*., 'Lo scavo e la sequenza insediativa nel monastero', in Gelichi *et al.* (eds.), *Nonantola 6*: 125-136.

Cimino R., 'Angelberga: il monastero di San Sisto di Piacenza e il corso del fiume Po', in T. Lazzari (ed.), *Il patrimonio delle regine: beni del fisco e politica regia fra IX e X secolo*, *RM* 13/2 (2012): 141-162.

Cirelli E., 'La dieta dei monaci. Cultura materiale e alimentazione nei monasteri Benedettini tra IX e X secolo', *HAM* 19 (2013), 227-240.

Cirelli E., 'Le città dell'Italia del nord nell'epoca dei re (888-962 AD)', in M. Valenti – C. Wickham (eds.), *Italy*: 131-168.

Cirelli E., *Ravenna: archeologia di una città* (Florence 2008).

Cirelli E., 'Anfore globulari a Classe nell'alto Medioevo', in Volpe – Favia (eds.), *V Congresso*: 563-568.

Clark P. (ed.), *The Early Modern Town* (New York 1976).

Classen P., *Karl der Grosse, das Papsttum und Byzanz: Die Begründung des karolingischen Kaisertums* (Sigmaringen 1985).

Clifford H.M. *et al*., 'A 2000-year Saharan dust event proxy record from an ice core in the European Alps', *Journal of Geophysical Research: Atmospheres* 124 (2019): 1-18.

Coates P. *et al*. (eds.), *Local Places, Global Processes: Histories of Environmental Change in Britain and Beyond* (Oxford 2016).

Cortonesi A. *et al*. (eds.), *Uomini e campagne nell'Italia medievale* (Bari 2002).

Costambeys M., *Power and Patronage in Early Medieval Italy, Local society, Italian politics and the Abbey of Farfa, c. 700-900* (Cambridge 2007).

Costambeys M., Innes M., MacLean S., *The Carolingian World* (Cambridge 2011).

Cuozzo E., Déroche V., Peters-Custot A., Prigent V. (eds.), Puer Apuliae*: mélanges offerts à Jean-Marie Martin* (Paris 2008).

Curina R. – Negrelli C. (eds.), *1º Incontro di Studio sulle Ceramiche Tardoantiche e Alto Medievali* (Mantua 2002).

Cracco Ruggini L., 'Città tardoantica, città altomedievale: permanenze e mutamenti', *Anabases* 12 (2010): 103-118.

Cremaschi M., Marchetti M., Ravazzi C., 'Geomorphological evidence for land surfaces cleared from forest in the Central Po Plain (Northern Italy) during the Roman period', in *Paleoclimate Research, Paläoklimaforschung* 10 (1994): 119-132.

Cremonini P., 'Storia e storie attraverso le fonti scritte', in S. Gelichi *et al.* (eds.), *Un villaggio*: 26–87.

Cremonini S., 'Morfologie d'alveo e morfogenesi nella media pianura Padana: il caso del Panaro nell'età del Bronzo', in M. Cattani *et al*. (eds.), *Paesaggio ed economia*: 27-33.

Cremonini S. *et al.*, 'The late-antiquity environmental crisis in Emilia region (Po river plain, Northern Italy): Geoarchaeological evidence and paleoclimatic considerations', *Quaternary International* 316 (2013): 162-178.

Dall'Aglio P.L., 'Centuriazione e geografia fisica', in P.L. Dall'Aglio – G. Rosada (eds.), *Sistemi centuriali*: 279-298.

Dall'Aglio P.L., 'Viabilità Romana e viabilità altomedievale: continuità e discontinuità. La via Francigena da Piacenza a Lucca', in S. Patitucci-Uggeri (ed.), *La viabilità medievale in Italia*: 73-88.

Dall'Aglio P.L., Ferrari K., Mete G., 'Dalla città Romana alla città tardoantica: trasformazioni e cambiamenti nelle città della Pianura Padana centro-occidentale', in M. Do Carmo Ribeiro – A.S. Melo (eds.), *Evolução da paisagem urbana: sociedade ed economia* (Braga 2014): 69-98.

Dall'Aglio P.L., Pellegrini L., Ferrari K., Marchetti G., 'Correlazioni tra geografia fisica e urbanistica antica: il caso della Pianura Padana Centrale', *ASTSN A* 116 (2011): 85–94.

Dall'Aglio P.L. – Rosada G. (eds.), *Sistemi centuriali e opere di assetto agrario tra età Romana e primo medioevo* (Rome 2010).

Dalla Negra R. *et al.*, 'Ferrara: contributi per la storia urbana', in M. Bondanelli (ed.), *Problematiche strutturali dell'edilizia storica in zona sismica, contributi al seminario di studi, Ferrara, 1-22 ottobre 2009* (Ferrara 2009): 103–158.

Dalla Negra R. *et al.*, 'Le ricerche sulla città di Ferrara finalizzate alla sua conservazione: prime ipotesi attorno alla nascita e all'evoluzione del Castrum Ferrariae', in Id. (eds.), *Competenze e strumenti per il patrimonio culturale. Il caso del territorio ferrarese* (Ferrara 2010).

Davidson A. (ed.), The Coastal Archaeology of Wales (York 2000).

Davies W., *Small Worlds: The Village Community in Early Medieval Brittany* (Los Angeles 1988).

de Boe G. – Verhaeghe F. (eds.), *Urbanism in Medieval Europe* (Zellik 1997).

de Jong M., *In Samuel's image. Child oblation in the early medieval west* (New York-Cologne 1996).

De Marchi M., 'Insediamenti longobardi e castelli tardoantichi tra Ticino e Mincio', in G.P. Brogiolo (ed.), *Le fortificazioni del Garda*: 109-136.

De Marchi M., 'Calvisano e le necropoli d'ambito longobardo in località Santi di Sopra. La pianura tra Oglio, Mella e Chiese nell'altomedioevo', in L. Paroli (ed.), *L'Italia*: 377–411.

Destefanis E., *Il monastero di Bobbio in età altomedievale* (Florence 2002).

Davis J.R. - McCormick M. (eds.), *The Long Morning of Medieval Europe: New Directions in Early Medieval Studies* (Aldershot 2008).

De Rubeis F. – Marazzi F. (eds.), *Monasteri in Europa occidentale (secoli VIII-XI): topografia e strutture* (Rome 2008).

Devroey J.P., *La Nature et le roi, Environnement pouvoir et société à l'âge de Charlemagne (740-820)* (Paris 2019).

Devroey J.P., 'Courants et réseaux d'échange dans l'économie franque entre Loire et Rhin', *Settimane* 40 (1993): 327-393.

Devroey J.P., 'Un monastère dans l'économie d'échanges : les services de transport à l'abbaye de Saint-Germain-des-Prés au IX[e] siècle', in *Annales. Economies-Société-Civilisations* 39 (1984): 570-589.

Devroey J.P., 'Les services de transport à l'abbaye de Prüm au IX[e] siècle', in *Revue du Nord* 61 (1979): 543-569.

Die Wasserversorgung im Mittelalter (Mainz 1991).

Downey L. – O'Sullivan M., 'Know your Monuments: Medieval fisheries', *Archaeology Ireland* 23/3 (2009): 30-33.

Dupré Theseider E., 'Problemi della città nell'alto medioevo', *Settimane* 6 (1959): 15-46.

Dutton P.E., 'Observations on Early Medieval Weather in General, Bloody Rain in Particular', in J.R. Davies – M. McCormick, (eds.), *The Long Morning*: 167-180.

Elsdon B., *Fishing methods and devices of the Maori* (Wellington 1929).

Engelhardt B. *et al*., 'Early Medieval wells from Pfettrach, Bavaria: cultural ecology of an early Bavarian village', *Archeologia Polona* 37 (1999): 87-118.

Ermini Pani L. (ed.), *Teoria e pratica del lavoro nel monachesimo altomedievale* (Spoleto 2015).

Fantoni R. *et al*. (eds.), *La pietra ollare nelle Alpi. Coltivazione e utilizzo nelle zone di provenienza* (Florence 2018).

Fasoli G., 'Navigazione fluviale. Porti e navi sul Po', *Settimane* 25 (1978): 565-607.

Fasoli G., 'Aspetti di vita economica e sociale nell'Italia del secolo VII', *Settimane* 5 (1958): 103-160.

Fasoli G. – Pighi G.B., 'Il privilegio Teodosiano: La composizione del falso diploma teodosiano', in *Studi e memorie dell'Università di Bologna, n.s.* 2 (1961): 58-94.

Ferraresi G., 'S. Maria di Pomposa tra acque e terre (secoli IX-XI)', *Quaderni del MAES* 7 (2004): 37-56.

Ferrari I. – Pellegrini M. (eds.), *Un Po di carte. La dinamica fluviale del Po nell'Ottocento e le tavole della Commissione Brioschi* (Reggio Emilia 2007).

Ficara M., 'L'occupazione dei dossi fluviali nel territorio di Reggio Emilia: il caso di Canolo di Mezzo', in N. Mancassola – F. Saggioro (eds.), *Medioevo*: 147-168.

Filippi F. *et al*., 'La produzione di una fornace altomedievale per ceramica da Libarna (AL)', in Pantò (ed.), *Produzione e circolazione*: 57-83.

Fiorotto C., 'Human settlement and environment in the Medieval Bassa Romagna (Ravenna, Italy) c. 800-1200', *Medieval Settlement Research* 33 (2018): 28-39.

Fontana A. *et al*., 'Alluvial megafans in the Venetian-Friulan Plain (north-eastern Italy) Evidence of sedimentary and erosive phases during Late Pleistocene and Holocene', *Quaternary International* 189 (2008): 71-90.

Foschi P., 'La medievale via *Cassiola'*, in P. Foschi *et al*., *La viabilità appenninica*: 79-100.

Foschi P., 'La presenza dell'incolto nel territorio bolognese nei secoli VIII-X', *Rivista di storia dell'agricoltura* 18 (1978): 91-105.

Foschi P., Penoncini E., Zagnoni R. (eds.), *La viabilità appenninica dall'Età Antica ad oggi* (Porretta Terme-Pistoia 1998).

Franchini S., *L'Ordo Domus Mathae di Ravenna. Identità giuridica e sopravvivenza storica di una corporazione medievale*, PhD Thesis (University of Ferrara, 2001-2002).

Francovich R. – Gelichi S. (eds.), *Monasteri e castelli fra X e XII secolo. Il caso di San Michele alla Verruca e le altre ricerche storico-archeologiche nella Tuscia occidentale* (Florence 2003).

Francovich R. – Hodges R., *Villa to village. The transformation of the Roman Countryside in Italy* (London 2003).

Francovich R. – Milanese M. (eds.), 'Lo scavo archeologico di Montarrenti e i problemi dell'Incastellamento medievale. Esperienze a confronto, Atti del colloquio internazionale (Siena, 8 dicembre 1988)', *ArchMed* 16 (1989): 7-288.

Francovich R. – Noyé G. (eds.), *La storia dell'altomedioevo italiano (VI-X secolo) alla luce dell'archeologia* (Florence 1994).

Francovich R. – Valenti M. (eds.), *IV Congresso Nazionale di Archeologia Medievale* (Florence 2006).

Frati V. *et al*. (eds.), *San Salvatore di Brescia. Materiali per un museo I/II* (Brescia 1978)

Frisia S., Borsato A., Spötl C., Villa I.M., Cucchi F., 'Climate variability in the SE Alps of Italy over the past 17000 years reconstructed from a stalagmite record', *Boreas* 34 (2005): 445-455.

Frison C., 'Bondeno tra alto e pieno Medioevo', in F. Berti *et al*. (eds.), *Bondeno*: 307-317.

Fronza V., 'Edilizia in materiali deperibili nell'alto medioevo italiano: metodologie e casi di studio per un'agenda della ricerca', *PCA* 1 (2011): 95-138.

Fumagalli V., 'Il paesaggio si trasforma: colonizzazione e bonifica durante il medioevo. L'esempio emiliano', in B. Andreolli *et al.* (eds.), *Le campagne*: 95-131.

Fumagalli V., 'Colonizzazione e bonifica nell'Emilia durante il medioevo', in *I settant'anni del Consorzio della bonifica renana 1909-1979* (Bologna 1980): 27-50.

Fumagalli V., *Coloni e signori nell'Italia settentrionale. Secoli VI-XI* (Bologna 1978).

Fumagalli V., *Terra e società nell'Italia padana. I secoli IX e X* (Torino 1974).

Fumagalli V., 'Colonizzazione e insediamenti agricoli nell'Occidente altomedioevale: la Valle Padana', *Quaderni Storici* 14 (1970): 319-338.

Fumagalli V., 'Note sui disboscamenti nella Pianura Padana in epoca carolingia', *Rivista di storia dell'agricoltura* 7 (1967): 139-146.

Gabert P., *Les plaines occidentales du Pô et leurs piedmonts* (Gap 1962).

Gadd D. – Ward Perkins B., 'The development of urban domestic housing in north Italy. The evidence of the excavations on the San Romano Site, Ferrara (1981-4)', *The Journal of the Accordia Research Centre* 2 (1991): 105-127.

García A., Izquierdo R., Olmo L., Peris D. (eds.), *Espacios urbanos en el occidente mediterráneo (S. VI-VIII)* (Toledo 2010).

Galetti P., 'I mulini monastici tra IX e XI secolo: tecnologia e organizzazione del lavoro e della produzione', in L. Pani Ermini (ed.), *Teoria e pratica*: 267-292.

Galetti P., 'La forza delle acque: i mulini nell'Italia medievale', *Riparia* 0 (2014): 99-123.

Galetti P., 'I Paesaggi rurali italiani dell'alto medioevo. Sistemi insediativi e assetti di produzione', in *Norba. Revista de Historia* 25/26 (2012/2013): 89-103.

Galetti P., 'Production, commercialisation et qualité de meules à main et de meules à moulin dans l'Italie médiévale': un bilan de la recherche historique et archéologique', in D. Williams – D. Peacock (eds.), *Bread for the People*: 209-216.

Galetti P., 'Acque e mulini tra Età Medievale e Moderna', in P. Galetti – B. Andreolli (eds.), *Mulini*: 17-26.

Galetti P., 'Bosco e spazi incolti nel territorio piacentino durante l'alto Medioevo', in B. Andreolli – M. Montanari (eds.), *Il bosco nel medioevo* (Bologna, 1988): 199-221.

Galetti P., 'La casa dei contadini: strutture materiali dell'insediamento rurale nell'Italia padana (secoli VIII-XIV)', in B. Andreolli *et al*., *Le campagne*: 163-194.

Galetti P. (ed.), *Paesaggi, comunità, villaggi medievali (Atti del convegno internazionale di studio, Bologna, 14–16 gennaio 2010)* (Spoleto 2012).

Galetti P. (ed.), *Villaggi, comunità, paesaggi medievali* (Spoleto 2011).

Galetti P. (ed.), *Edilizia residenziale tra IX e X secolo. Storia e archeologia* (Florence 2010).

Galetti P. (ed.), *Civiltà del legno: per una storia del legno come materia per costruire dall'antichità ad oggi* (Bologna 2004).

Galetti P. – Andreolli B. (eds.), *Mulini, canali e comunità della pianura bolognese tra Medioevo e Ottocento* (Bologna 2009).

Galetti P. – Racine P. (eds.), *I mulini nell'Europa medievale* (Bologna 2003).

Galloni P., 'Un gioco che non è un gioco: la caccia altomedievale', *Settimane* 65 (2018): 531-569.

Gardoni G., 'Vescovi e città a Mantova dall'età carolingia al secolo XI', in G. Andenna *et al*. (eds.)., *Le origini*: 183-246.

Gelichi S., 'Il monastero nel tempo', in Gelichi *et al*. (eds.), *Nonantola 6*: 398-399.

Gelichi S., 'Lo scavo. Localizzazione del sito, tempi e strategie', in S. Gelichi *et al.* (eds.), *Un villaggio*: 17-25.

Gelichi S., 'Hodierni vero vocant Ferrariam. Il mito delle origini antiche di una città e l'archeologia', *Annali Online di Ferrara – Lettere* 1 (2012): 3-21.

Gelichi S., 'Local and Interregional Exchanges in the Lower Po Valley (Eighth-Ninth Centuries)', in C. Morrisson (ed.), *Trade and Markets*: 218-234.

Gelichi S., 'La città in Italia tra VI e VIII secolo: riflessioni dopo un trentennio di dibattito archeologico', in A. García *et al*. (eds.), *Espacios urbanos en el occidente mediterráneo (S. VI-VIII)* (Toledo 2010): 65-86.

Gelichi S., 'Flourishing places in North-Eastern Italy. Towns and emporia between late antiquity and the Carolingian age', in J. Henninig (ed.), *Post-Roman Towns*: 77-104.

Gelichi S., 'The Rise of an Early Medieval Emporium and the Economy of Italy in the late Longobard Age', *Annals for Istrian and Mediterranean Studies* 18 (2008): 319-336.

Gelichi S., 'Gestione e significato sociale della produzione, della circolazione e dei consumi della ceramica nell'Italia dell'alto-medioevo', in Brogiolo–Chavarría Arnau (eds.), *Archeologia e società*: 59-61.

Gelichi S., 'Tra Comacchio e Venezia. Economia, società e insediamenti nell'arco nord adriatico durante l'Alto Medioevo', in Berti et al. (eds.), *Genti nel delta*: 365-386

Gelichi S., 'Venezia tra archeologia e storia: la costruzione di un'identità urbana', in Augenti (ed.), *Le città italiane*: 151-183.

Gelichi S., 'Un'abbazia e il suo territorio: un progetto di ricerca archeologica su Nonantola', in Id. (ed.), *Campagne medievali*: 223-243.

Gelichi S., 'L'età post-antica: qualche riflessione sui metodi e sui risultati', in Cardarelli–Malnati (eds.), *Atlante Modena I*: 53-57.

Gelichi S., 'The cities', in C. La Rocca (ed.), *Italy*: 168-188.

Gelichi S., 'Il Castello estense e l'archeologia urbana a Ferrara: riflessioni dopo un decennio di ricerche', in Id. (ed.), *Ferrara*: 15-21.

Gelichi S. (ed.), *La circolazione delle ceramiche nell'Adriatico tra tarda antichità e altomedioevo* (Mantova 2007).

Gelichi S. (ed.), *Campagne medievali: strutture materiali, economia e società nell'insediamento rurale dell'Italia settentrionale (VIII - X secolo)* (Mantova 2005).

Gelichi S. (ed.), *I Congresso Nazionale di Archeologia Medievale* (Florence 1997).

Gelichi S. (ed.), *Ferrara prima e dopo il castello. Testimonianze archeologiche per la storia della città* (Ferrara 1992).

Gelichi S. (ed.), *Archeologia e insediamento rurale in Emilia-Romagna nel medioevo. Contributi per una ricerca* (Bologna 1991).

Gelichi S. – Calaon D., 'Comacchio: la storia di un emporio sul delta del Po', in Berti *et al*. (eds.), *Genti nel delta*, 387-416.

Gelichi S. *et al*., 'Importare, produrre e consumare nella laguna di Venezia dal IV al XII secolo. Anfore, vetri e ceramiche', in Gelichi – Negrelli (eds.), *Adriatico altomedievale*: 23-114

Gelichi S. *et al*., 'Venezia e la laguna tra IX e X secolo: strutture materiali, insediamenti, economie', Gelichi S. – Gasparri S. (eds.), *The Age*: 79-128.

Gelichi S. *et al*., 'Comacchio tra IV e IX secolo d.C.: territorio, abitato e infrastrutture', in R. Francovich – M. Valenti (eds.), *IV Congresso*, 114-123.

Gelichi S. *et al*., 'La transazione dell'Antichità al Medioevo nel territorio dell'antica Regio VIII', in G.P. Brogiolo *et al*. (eds.), *Dopo la fine delle ville*, 53–80. Gelichi S. *et al*., 'Studi e ricerche archeologiche sul sito altomedievale di Cittanova', in A. Cardarelli *et al*. (eds.), *Modena I*, 577–603.

Gelichi S. – Librenti M., 'Interpretare uno scavo', in S. Gelichi *et al.* (eds.), *Un villaggio*, 402–404.

Gelichi S. – Librenti M., 'Tracce di attività molinatoria in un villaggio del X secolo della Pianura Padana', in B. Andreolli – P. Galetti (eds.), *Mulini*, 347-358.

Gelichi S.– Librenti M., 'Un villaggio fortificato dei secoli centrali del medioevo nei pressi di S. Agata Bolognese (BO)', in S. Gelichi (ed.), *Campagne medievali*, 101–117.

Gelichi S. – Gasparri S. (eds.), *The Age of Affirmation: Venice, the Adriatic and the Hinterland between the 9th and 10th Centuries* (Turnhout 2017).

Gelichi S. *et al.* (eds.), *Nonantola 6 – Monaci e contadini. Abati e re. Il monastero di Nonantola attraverso l'archeologia (2002-2009)* (Florence 2018).

Gelichi S. *et al*. (eds.), *Un villaggio nella pianura. Ricerche archeologiche in un insediamento medievale del territorio di Sant'Agata Bolognese* (Florence 2014).

Gelichi S. – Hodges R. (eds.), *From one sea to another. Trade places in the European and Mediterranean Early Middle ages* (Turnhout 2012).

Gelichi S. – Negrelli C. (eds.), *Adriatico altomedievale (VI-XI secolo) Scambi, porti, produzioni* (Venezia 2017).

Gherardi F. *et al*. (eds.), *Biodiversity Conservation and Habitat Management I* (Oxford 2009).

Gilchrist D. – Sloane B., *Requiem: The Medieval Monastic Cemetery in Britain* (London 2005).

Good G.L. *et al*. (eds.), *Waterfront Archaeology* (York 1991).

Goodson C., *Urban gardening in Early Medieval Italy: cultivating the city* (Cambridge forthcoming).

Goodson C., 'Admirable and Delectable Gardens: *Viridaria* in Early Medieval Italy,' EME 27/3 (2019) 416-440.

Goodson C., 'Garden Cities in Early Medieval Italy', in R. Balzaretti *et al*. (eds.), *Italy*: 339-355.

Graham B.J., *Profile of a Plant: The Olive in Early Medieval Italy, 400-900 CE*, PhD thesis (University of Michigan 2014).

Grandi E., 'Un delta in movimento. Il caso di Comacchio tra tarda antichità e medioevo'. RM 16/2 (2015): 231-261.

Grassi B. – Miedico C. (eds.), *Il profumo del pane e delle castagne: dai semi di Cislago ai panini di Angera I: la villa rustica di Cislago, i resti organici e il paesaggio agroalimentare in età Romana* (Arona 2015).

Greci R., 'Porti fluviali e ponti in età medievale. Il Po e l'area padana', *HAM* 22 (2016): 238-248.

Grove A.T. –Rackham O., *The nature of Mediterranean Europe: an ecological history* (Boston 2003).

Guarnieri C., 'Una indagine nel centro storico di Ferrara: lo scavo di via Vaspegolo – corso Porta Reno (1993-94)', in G. de Boe – F. Verhaeghe (eds.), *Urbanism*: 237-248.

Guarnieri C., 'Ferrara, corso Porta Reno 22-28. 1993', *ArchMed* 21 (1994): 409.

Guarnieri C. *et al*., 'Ravenna, una città in declino? Contesti altomedievali di ambito urbano', in Gelichi – Negrelli (eds.), *Adriatico altomedievale*: 115-158.

Guarnieri C. – Librenti M., 'Ferrara, sequenza insediativa pluristratificata via Vaspergolo Corso Porta Reno (1993-94). 1. Lo scavo', in *ArchMed* 23 (1996): 275-307.

Guillerme A., *Les Temps de l'eau. La Cité, L'Eau et les techniques* (Paris 1983).

Guzzetti F., Marchetti M., Reichenbach P., 'Large alluvial fans in the north-central Po Plain (Northern Italy)', *Geomorphology* 18 (1997): 119-136.

Halfond G.I., 'Transportation, Communication, and the Movement of Peoples in the Frankish Kingdom, ca. 500-900 C.E', *History Compass* 7/6 (2009): 1554-1555.

Hamesse J. – Muraille-Samaran C. (eds.), *Le travail au Moyen Age, Une approche interdisciplinaire* (Louvain-La-Neuve 1990).

Hansen I.L. – Wickham C. (eds.), *The Long Eighth Century, Production, Distribution and Demand* (Leiden 2000).

Harris W.V. (ed.), *Rethinking the Mediterranean* (Oxford 2005).

Hartmann L.M., *Zur Wirtschaftsgeschichte Italiens im frühen Mittelalter* (Gotha 1904).

Harvey S. – Fieldhouse K. (eds.), *The cultured landscape: designing the environment in the 21st century* (Abingdon 2005).

Heighway C.M. (ed.), *The erosion of History. Archaeology and Planning Towns: A study of historic towns affected by modern development in England, Wales and Scotland* (London 1972).

Henning J. (ed.), *Post-Roman towns, trade and settlement in Europe and Byzantium. The heirs of the Roman west 1* (Berlin 2007).

Henrard D. – Léotard J.M., 'Liège au Haut Moyen Âge: un état de la question', in T. Panhuysen (ed.), *Transformations*: 47-54.

Hermon E. (ed.), *Vers une gestion intégrée de l'eau dans l'Empire Romain* (Rome 2008).

Higounet C., 'Les forêts de l'Europe occidentale du V^e^ au XI^e^ siècle', *Settimane* 13 (1966): 343-398.

Hlawitschka E., *Franken, Alemannen, Bayern und Burgunder in Oberitalien (775-962): Zum Verständnis der Fränkischen Königsherrschaft in Italien* (Freiburg 1960).

Hodges R., 'In Small Things Forgotten. *Iuxta Flumen Vulturnum*. Gli Scavi lungo il fronte fluviale di San Vincenzo al Volturno', *ArchMed* 43 (2016): 417-421.

Hodges R., 'Adriatic Sea trade in a European perspective', in Gelichi – Hodges (eds.), *From one sea*: 207-234.

Hodges R., *Dark Age Economics* (London 1982).

Hodges R. – Hobleys B. (eds.), *The rebirth of towns in the West* (London 1988).

Hoffmann R.C., *Environmental History of Medieval Europe* (Cambridge 2014).

Hoffmann R.C., 'A brief history of aquatic resource use in medieval Europe', *Helgoland Marine Research* 59 (2005): 22-30.

Hoffmann R.C., 'Medieval fishing', in P. Squatriti (ed.), *Working with water*: 331-393.

Hoffmann R.C., 'Economic Development and Aquatic Ecosystem in Medieval Europe', *The American Historical Review* 101/3 (1996): 631-669.

Holt R, *The Mills of Medieval England* (Oxford 1988)

Holzhauser H., Magny M., Zumbühl H.J., 'Glacier and lake-level variations in west-central Europe over the last 3500 tears', *The Holocene* 15/6 (2005): 789-801.

Hooimeijer F. – van der Toorn Vrijthoff W., *More Urban Water. Design and Management of Dutch Water Cities* (Leiden 2008).

Hopf M., 'South and Southwest Europe', in W. Van Zeist (ed.), *Progress in Old World Palaeoethnobotany* (Rotterdam 1991): 241-277.

Horden P., 'Travel Sickness: Medicine and Mobility in the Mediterranean from Antiquity to the Renaissance', in W.V. Harris (ed.), *Rethinking the Mediterranean*: 179-199.

Hordern P. – Purcell N., *The Corrupting Sea: A Study of Mediterranean History* (London 2000).

Horry A., 'La céramique dans la moyenne vallée du Rhône (VI^e^-XIII^e^ s.)', in Maufras (ed.), *Habitants*: 363-406.

Hoskins W.G., *The Making of the English Landscape* (London 1955).

Hudson P., 'Pavia: l'evoluzione urbanistica di una capitale altomedievale', in *Storia di Pavia 2*: 237-316.

Hyde J.K., 'Medieval descriptions of cities', *Bulletin of the John Rylands Library* 48/2 (1966): 308-340.

Innes M., *State and Society in the Early Middle Ages. The Middle Rhine Valley. 400-1000* (Cambridge 2000).

Innes M., 'Framing the Carolingian Economy', *Journal of Agrarian Change* 9/1 (2009): 42-58.

Insediamenti e viabilità nell'alto ferrarese dall'Età Romana al Medioevo (Cento, 8-9 maggio 1987), (Ferrara 1989).

Huber-Rebenich G., Pipe C., Pride M. (eds.), *Wasser in der mittelalterlichen Kultur. Gebrauch - Wahrnehmung – Symbolik* (Berlin 2017).

I paesaggi agrari d'Europa (secoli XIII-XV), Atti del XXIV Convegno Internazionale di Studi (Pistoia, 16-19 maggio 2013) (Rome 2015).

Jaccottey L. – Rollier G. (eds.), *Archéologie des moulins hydrauliques, à traction animale et avent des origines à l'époque médiévale et modern en Europe et dans le monde méditerranéen* (Dijon 2016).

Jansma E. *et al*., 'Traveling through a river delta: a landscape-archaeological reconstruction of river development and long-distance connections in the Netherlands during the first millennium AD', *Medieval Settlement Research* 32 (2017): 35-39.

Kaltenrieder P., Procacci G., Vannière B., Tinner W., 'Vegetation and fire history of the Euganean hills (Colli Euganei) as recorded by Lateglacial and Holocene sedimentary series from Lago della Costa (north-eastern Italy)', *The Holocene* 20/5 (2010): 679-695.

Keevil G. *et al*. (eds.), *Monastic Archaeology* (Oxford 2001).

Knobloch R., 'Il sistema stradale di età Romana: genesi ed evoluzione', *Insula Fulcheria* 40 (2000): 8-29.

Kröger L., 'Les bateaux fluviaux médiévaux sur le Main et le Neckar. Les bacs comme composantes d'un paysage culturel fluvial', in É. Peytremann (ed.), *Des Fleuves*: 89-104.

Kröger L. – Werther L., 'Vom Rhein zur Donau - Überlegungen zur Binnenschifffahrt zwischen Römischer Kaiserzeit und Hochmittelalter', in R. Atzbach *et al*. (eds.), *Archäologie*: 249-282.

Kurze W., 'La "via Francigena" nel periodo longobardo', *De strata Francigena* 6/1 (1998): 29-37.

Kurze W., 'Le comunicazioni fra Nord e Centro Italia nel Medioevo', in P. Foschi *et al*. (eds.), *La viabilità appenninica*: 17-28.

La ceramica medievale nel Mediterraneo Occidentale. Atti del III Congresso Internazionale organizzato dal Dipartimento di Archeologia e Storia delle Arti dell'Università degli Studi di Siena e dal Museo delle Ceramiche di Faenza (Siena-Faenza 1984) (Florence 1986).

La civiltà comacchiese e pomposiana dalle origini preistoriche al tardo medioevo, Atti del Convegno Nazionale di studi storici Comacchio 1984 (Bologna 1986).

La pianura e le acque tra Bologna e Ferrara: un problema secolare. Atti del convegno di studi, Cento 18-20 marzo 1983 (Ferrara 1993).

La Rocca C., 'Fuit civitatis prisco in tempore. Trasformazioni dei municipia abbandonati dell'Italia occidentale nel secolo XI', *Segusium* 29 (1992): 238-278.

La Rocca C., 'Trasformazioni della città altomedievale in "Langobardia"', *Studi Storici* 30/4 (1989): 993-1011.

La Rocca C., 'Lo sviluppo dell'insediamento di Testona tra XI e XIII secolo', *Bollettino del Centro di studi storici, archeologici ed artistici del territorio di Moncalieri* 11 (1981): 5-27.

La Rocca C. (ed.), *Italy in the early middle ages* (Oxford 2002).

Laurence R., *The Roads of Roman Italy: Mobility and Cultural Change* (London-New York 1999).

Lazzari T., 'La tutela del patrimonio fiscale: pratiche di salvaguardia del pubblico e autorità regia nel regno longobardo del secolo VIII', *RM* 18/1 (2017): 1-23.

Lazzari T. (ed.), *Il patrimonio delle regine: beni del fisco e politica regia fra IX e X secolo*, *RM* 13/2 (2012).

Lebecq S., *Marchands et navigateurs frisons du haut Moyen Age, I* (Lille 1983).

Leiciejewicz L. *et al*., *Torcello. Scavi 1961-62* (Rome 1977).

Lewis A.R., *Medieval Society in Southern France and Catalonia* (London 1984).

Lewis A.R., 'The Rhone Valley Route and Traffic between the Mediterranean and Northern Europe, 300-1200', in Id., *Medieval Society in Southern France and Catalonia* (London 1984).

Librenti M., 'Ricognizioni di superficie e insediamento medievale nella pianura emiliano Romagnola. Alcune considerazioni', in G.P. Brogiolo (ed.), *II Congresso*: 170-174.

Librenti M. – Cianciosi A. (eds.), *Nonantola 3 – Le terre dell'Abate. Il Nonantolano tra Tardantichità e Medioevo* (Florence 2011).

Librenti M. – Marvelli S., 'Paesaggio vegetale e utilizzo delle risorse legnose: il contributo delle analisi xilo-antracologiche', in S. Gelichi *et al.* (eds.), *Un villaggio*: 324-341.

Librenti M. – Negrelli C., 'Le indagini archeologiche 1990-1991 a Ferrara. Dati per la topografia tardomedievale dell'area urbana', in R. Francovich – M. Valenti (eds.), *IV Congresso*: 109-13.

Librenti M. – Pancaldi P., 'Lo scavo. Il villaggio e i fossati', in S. Gelichi *et al.* (eds.), *Un villaggio*: 88-92.

Lo Cascio E. – Malanima P., 'Mechanical Energy and Water Power in Europe. A Long Stability?', in E. Hermon (ed.), *Vers une gestion intégrée*: 201-208.

Lohrmann D., 'Le moulin à eau dans le cadre de l'économie rurale de la Neustrie (VIIe-IXe siècle), in H. Atsma (ed.), *La Neustrie*: 367-404.

Lohrmann D., 'Travail manuel et machines hydrauliques avant l'an mil', in J. Hamesse – C. Muraille-Samaran (eds.), *Le travail*: 35-47.

Loré V., 'Monasteri, re e duchi. Modelli di relazione fra VIII e X secolo', *Settimane* 64 (2017): 947-985.

Loré V. *et al*. (eds.), *Acquérir, prélever, contrôler: les ressources en compétition (400-1100)* (Turnhout 2017).

Loveluck C., 'The dynamics of portable wealth, social status and competition in the ports, coastal zones and river corridors of northwest Europe, c. AD 650-1100', in V. Loré *et al*. (eds.), *Acquérir, prélever, contrôler*: 299-322.

Loveluck C. *et al*., 'Alpine ice-core evidence for the transformation of the European monetary system, AD 640–670', *Antiquity* 92/366 (2018): 1571-1585.

Lucas A.R., 'Industrial Milling in the Ancient and Medieval Worlds. A survey of the Evidence for an Industrial Revolution in Medieval Europe', *Technology and Culture* 46 (2005): 1-30.

Lusso E. – Panero F. (eds.), *Insediamenti umani e luoghi di culto fra medioevo ed età moderna. Le diocesi di Alba, Mondovì e Cuneo* (La Morra 2011).

Lusuardi Siena S. (ed.), *Dalla curtis alla pieve fra archeologia e storia. Territori a confronto: l'Oltrepò pavese e la pianura veronese* (Mantova 2008).

Lusuardi Siena S. (ed.), Ad mensam. *Manufatti d'uso da contesti archeologici fra tarda Antichità e Medioevo* (Udine 1994).

Lusuardi Siena S. *et al*., 'La ceramica altomedievale tra Lombardia e Friuli', in S. Patitucci-Uggeri (ed.), *La ceramica altomedievale*: 59-102.

Lusuardi Siena S. – Giostra C., 'San Benedetto Po: l'abbazia di Matilde di Canossa. Archeologia di un grande monastero dell'Europa benedettina', in Somma (ed.), *Cantieri e Maestranze*: 483-498.

Luterbacher J. *et al*., 'European summer temperatures since Roman times', *Environmental Research Letters* 11 (2016): 1-12.

Magnani S., 'Aquileia e l'entroterra venetico e retico: alcune considerazioni', in M. Chiabà (ed.), *Miscellanea*: 243-269.

Magnani S., 'Viabilità e comunicazioni tra Italia settentrionale ed area alpine nell'antichità: tendenze e prospettive di ricerca', in *Quaderni Friulani di Archeologia* 17 (2007): 23-43.

Magny M. *et al*, 'Holocene palaeohydrological changes in the northern Mediterranean borderlands as reflected by the lake-level record of Lake Ledro, northeastern Italy', *Quaternary Research* 77 (2012): 382-396.

Majocchi P., 'Le città europee nell'alto medioevo tra storia e archeologia (secoli V-X)', in *RM* 11/2 (2010): 183-196.

Majocchi P., 'Sviluppo e affermazione di una capitale altomedievale: Pavia in età gota e longobarda', in *RM* 11/2 (2010): 169-179.

Majocchi P., *Pavia città regia. Storia e memoria di una capitale medievale* (Rome 2008).

Malnati L. – Cardarelli A. (eds.), *Atlante dei Beni Archeologici della Provincia di Modena I. Pianura* (Florence 2003).

Manarini E., 'Politiche regie e attivismo aristocratico nell'Emilia carolingia. Il monastero di S. Silvestro di Nonantola', *Annali dell'Istituto Italiano per gli Studi Storici* 30 (2017): 7–74.

Mancassola N., 'Sistemi insediativi e rapporti di lavoro tra Langobardia e Romania dall'età carolingia alle soglie dell'anno mille (IX-X secolo)', in press.

Mancassola N., 'La grande proprietà fondiaria nel territorio dell'antico Esarcato di Ravenna (secoli IX-X)', in J.M. Martin *et al*., *L'héritage byzantine*: 119-144.

Mancassola N., *Uomini senza storia. La piccola proprietà rurale nel territorio di Piacenza dalla conquista carolingia alle invasioni ungariche (774-900)* (Spoleto 2013).

Mancassola N., 'Uomini e acque nella pianura reggiana durante il Medioevo (secoli IX-XIV)', in D. Canzian – R. Simonetti (eds.), *Acque e territorio*: 115-132.

Mancassola N., *L'azienda curtense tre Langobardia e Romania. Rapporti di lavoro e patti colonici dall'età carolingia al Mille* (Bologna 2008).

Mancassola N., 'Interpretazione di superficie del dato altomedievale in area padana. Il territorio a sud di Ravenna e la pianura a nord di Reggio Emilia', in N. Mancassola – F. Saggioro (eds.), *Medioevo*: 115-146.

Mancassola N., 'La ceramica grezza di Piadena (CR). Secoli IX-X', in Brogiolo – Mancassola (eds.), *Scavi*: 143-172.

Mancassola N. – Saggioro F., 'Insediamento rurale e campagne tra tarda antichità e altomedioevo. Territori tra Verona, Brescia e Mantova', *AnTard* 9 (2001): 307-330.

Mancassola N. – Saggioro F., 'Ricerche sul territorio tra tardo-antico e altomedioevo: il caso di studio del Garda orientale', in G.P. Brogiolo (ed.), *II Congresso*: 127-131.

Mancassola N. – Saggioro F. (eds.), *Medioevo, paesaggi e metodi* (Mantua 2006).

Marazzi F., 'Portus monasterii. Scali portuali monastici lungo il corso del Volturno (IX-X secolo), *Annuario ASMV* 2 (2014): 201-222.

Marazzi F., 'The Early Medieval Alternative. Monasteries as Centres of non City-based Economic Systems in Italy between Eight and Ninth Century AD', in B. Marin – C. Virlouvet (eds.), *Nourrir les cités*: 739-768.

Marazzi F., 'San Vincenzo al Volturno tra VIII e IX secolo: il percorso della grande crescita', in Id. (ed.), *San Vincenzo al Volturno*: 41-92.

Marazzi F. (ed.), *San Vincenzo al Volturno. Cultura, istituzioni, economia* (Monte Cassino 1996).

Marazzi F. – Frisetti A., 'Porti 'monastici' in Campania fra VIII e X secolo', in *HAM* 22 (2016): 227-237.

Marcando L. – Micheletto E. (eds.), *Archeologia in Piemonte. Il Medioevo* (Turin 1998).

Marchesini M. *et al*., 'Ricostruzione ambientale del paesaggio vegetale nella bassa pianura modenese-mantovana in età medievale', in M. Perboni (ed.), *Terre di confine*: 137-142.

Marchesini M. – Maravelli S., 'Paesaggio vegetale e utilizzo delle risorse legnose: il contributo delle analisi xilo-antracologiche', in S. Gelichi *et al.* (eds.), *Un Villaggio*: 324–341.

Marchetti M., 'Environmental changes in the central Po Plain (northern Italy) due to fluvial modifications and anthropogenic activities', *Geomorphology* 44 (2002): 370-372.

Mariotti V. (ed.), *La Valtellina nei secoli: studi e ricerche archeologiche II: Ricerche e materiali archeologici* (Mantova 2015).

Marin B. – Virlouvet C. (eds.), *Nourrir les cités de la Méditerranée: Antiquité – Moyen Âge* (Paris 2004).

Martin J.M., Peters-Custot A., Prigent V. (eds.), *L'héritage byzantin en Italie (VIII^{e}-XII^{e} siècle) II. Les cadres juridiques et sociaux et les institutions publiques* (Paris 2012).

Martinelli L., 'Note sui beni fondiari di un grande proprietario del X secolo: il conte Attone di Lecco', *Studi di storia medioevale e di diplomatica* 1 (1976): 1-16.

Martinelli N., 'Datazione assoluta di imbarcazioni monossili dell'Italia settentrionale', *Navis* 4 (2010): 315-318.

Martini A., *Manuale di metrologia* (Torino 1883).

Marvelli S. *et al*., 'Il paesaggio vegetale ricostruito attraverso le analisi polliniche', in S. Gelichi *et al.* (eds.), *Un villaggio*: 294–307.

Marzano A., 'Fish and Fishing in the Roman World', *Journal of Maritime Archaeology* 13/3 (2018): 437-447.

Marzano F.N., 'Control and Regulation of Freshwater Fisheries', in F. Gherardi *et al*. (eds.), *Biodiversity Conservation*, 337-363.

Maschke E. – Sydow J. (eds.), *Die Stadt am Fluß. Stadt in der Geschichte 4* (Sigmaringen 1978).

Matthews S., *The Road to Rome. Travel and Travellers between England and Italy in the Anglo-Saxon Centuries* (Oxford 2007).

Maufras O. (ed.), *Habitants, nécropoles et paysages dans la moyenne et la basse vallée du Rhône (VII^{e}-XV^{e} s.). Contribution des travaux du TGV-Méditerranée à l'étude des sociétés rurales médiévales* (Paris 2006).

Maxwell A.B., *Exploring variation in diet and Migration from Late Antiquity to the Early Medieval Period in the Veneto, Italy: A Biochemical Analysis*, PhD Thesis (University of South Florida, 2019).

Mazuch M., 'Fischereigerät aus Mikulčice und die Frage des Fischanteils an der Ernährung der Bewohner des Burgwalls', in L. Poláček (ed.), *Studien zum Burgwall V*: 355-399

Mazzi A., 'Questioni metrologiche lombarde', *Archivio storico lombardo* 38 (1911): 5-64.

McCormick M., 'Comparing and connecting: Comacchio and the early medieval trading towns', in S. Gelichi – R. Hodges (eds.), *From one sea*: 477-502.

McCormick M., *Origins of the European Economy: Communications and Commerce AD 300-900* (Cambridge 2001).

McCormick M, 'New Light on the 'Dark Ages'. How the Slave Trade Fuelled the Carolingian Economy', *P&P* 177 (2002): 17-54.

McCormick M., Dutton P.E., Mayewski P.A., *Volcanoes and the Climate Forcing of Carolingian Europe, A.D. 750-950*, *Speculum* 82/4 (2007): 865-895.

Medas S., 'La navigazione lungo le idrovie padane in epoca Romana', in G. Cantoini – A. Capurso (eds.), *On the road*: 146-163.

Melczer W., *The Pilgrim's Guide to Santiago de Compostela* (New York 1993).

Menant F., *Campagnes lombardes du Moyen Âge. L'économie et la société rurales dans la région de Bergame, de Crémone et de Brescia du Xe au XIIIe siècle* (Rome, 1993).

Menotti F. – O'Sullivan A., *The Oxford Handbook of Wetland Archaeology* (Oxford 2013).

Mercati e mercanti nell'alto medioevo: l'area euroasiatica e l'area mediterranea, Settimana XL (Spoleto 1993).

Mercuri A.M. *et al*., 'Pollen and macroremains from Holocene archaeological sites: a dataset for the understanding of the bio-cultural diversity of Italian landscape', *Review of Palaeobotany and Palynology* 218 (2015): 250-266.

Mercuri A.M. *et al*., 'A marine/terrestrial integration for mid-late Holocene vegetation history and the development of the cultural landscape in the Po valley as a result of human impact and climate change', *Vegetation History and Archaeobotany* 21/4-5 (2012): 353-372.

Meucci C. – Berti F., *Schede di archeologia dell'Emilia-Romagna. La nave di Comacchio: documenti di un restauro* (Bologna 1997).

Micheletto E., 'Chiese e città Romane abbandonate: alcuni esempi in Piemonte', in G.P. Brogiolo (ed.), *Chiese e insediamenti*: 109-118.

Mira G., *La pesca nel Medioevo* (Milan 1937).

Molinari A., 'La ceramica medievale in Italia ed il suo possibile utilizzo per lo studio della storia economica', in *ArchMed* 30 (2003): 519-528.

Mollo E., 'Le chiuse: realtà e rappresentazioni mentali del confine alpino nel medioevo', in *Bollettino storico bibliografico subalpino* 84 (1986): 333-390.

Montanari M., 'La foresta come spazio economico e culturale', *Settimane* 50 (2003): 301-340.

Montanari M., *L'alimentazione contadina nell'alto Medioevo* (Napoli 1979).

Mor C.G., *L'età feudale*, vol. 2 (Milan 1952).

Morandi D., 'La Chiesa dei Santi Nazzaro e Celso in località Pluda a Leno', *Brixia sacra* 14 (2009): 237–258.

Moreno D., *Dal documento al terreno. Storia e archeologia dei sistemi agro-silvo-pastorali* (Bologna 1990).

Moreno D. *et al*. (eds.), *Boschi: storia e archeologia* (Bologna 1982).

Morrisson C. (ed.), *Trade and Markets in Byzantium* (Washington 2012).

Mosca A., 'Navigation on Lake Garda from Antiquity to the Middle Ages', in G. Huber-Rebenich *et al*. (eds.), *Wasser*: 193-205.

Moss M.L., 'Fishing traps and weirs on the northwest coast of North America', F. Menotti – A. O'Sullivan, *The Oxford Handbook*: 323-337.

Muigg B. *et al*., 'Dendroarchaeological evidence of early medieval water mill technology', *Journal of Archaeological Science* 93 (2018): 17-23.

Mullins E., *The Pilgrimage to Santiago* (London 1974).

Mumford L., *Technics and Civilisation* (New York 1934).

Murialdo G., 'Alto-Adriatico e Alto-Tirreno nel mondo Mediterraneo: due mari a confronto tra VI e X secolo', in Gelichi (ed.), *La circolazione*: 9-29.

Musina G., *Le campagne di Piacenza tra VII e IX secolo: insediamenti e comunità*, PhD Thesis (University of Bologna 2012).

Nanni P. (ed.), *Agricoltura e ambiente attraverso l'età Romana e l'alto Medioevo* (Florence 2012).

Negrelli C., 'Le strutture del popolamento rurale tra IV e IX secolo in Emilia-Romagna e nelle Venezie', *AnTard* 21 (2013): 77-92.

Negrelli C., 'Towards a definition of early medieval pottery: amphorae and other vessels in the northern Adriatic between the 7th and the 8th centuries', in Gelichi – Hodges (eds.), *From one sea*: 415-438.

Negrelli C., 'Produzione, circolazione e consumo tra VI e IX secolo: dal territorio del Padovetere a Comacchio' in Berti *et al*. (eds.), *Genti nel delta*: 437-472.

Negrelli C., '(In)visibilità dell'alto medioevo: vasellame e strutture insediative nella parte orientale dell'Emilia-Romagna', in Volpe – Favia (eds.), *V Congresso*: 557-562.

Negri A., 'La ceramica grezza medievale in Friuli-Venezia Giulia' in Lusuardi Siena (ed.), Ad mensam: 63-96

Negro Ponzi M., 'Romani, bizantini e longobardi: le fortificazioni tardo antiche e altomedievali nelle alpi occidentali', in G.P. Brogiolo (ed.), *Le fortificazioni del Garda*: 137-154.

Nelson J. (ed.), *Medieval Polities and Modern Mentalities* (Cambridge 2006).

Nicosia C., *Geoarcheologia delle stratificazioni urbane post-classiche* (Rome 2018).

Nosov E., 'The river systems of eastern Europe and their role in the formation of towns and the Russian state', in G.P. Brogiolo (ed.), *Early medieval towns*: 175-179.

Nothdurfter H., 'Chiese del VII e VIII secolo in Alto Adige', in G.P. Brogiolo (ed.), *Le chiese rurali*: 123-158.

Ortenberg V., 'Archbishop Sigeric's Pilgrimage to Rome in 990', *Anglo-Saxon England* 19 (1990): 197-246.

O'Sullivan A., 'Medieval fish traps on the Shannon estuary, Ireland: interpreting people, place and identity in estuarine landscapes', *Journal of Wetland Archaeology* 5 (2005): 65-77.

O'Sullivan A., 'Place, memory and identity among estuarine fishing communities: interpreting the archaeology of early medieval weirs', *World Archaeology* 35 (2003): 449-468.

O'Sullivan M. – Downey L., 'Medieval fisheries', *Archaeology Ireland* 23/3 (2009): 30–33.

Pagliani M.L., *Piacenza. Forma e urbanistica* (Rome 1991).

Pallastrelli B., 'Il Porto e il Ponte del Po presso Piacenza', *Archivio Storico Lombardo* 4/1 (1877): 9-38

Palmer J., 'Calculating Time and the End of Time in the Carolingian World, c. 740-820', *English Historical Review* 126/523 (2011): 1307-1331.

Panato M., 'Rural monasteries and wilderness in Carolingian northern Italy: forest, water and ecclesiastical landscapes', in J.C. Sanchez-Pardo *et al*. (eds.), *Ecclesiastical Landscapes in Medieval Europe. A Comparative Approach* (Oxford 2020).

Panato M., *Il Rodano in epoca carolingia (VIII e IX secolo). Un sistema economico-fluviale*, MA Thesis (University of Bologna 2015).

Panero F., 'Insediamenti umani, pievi e cappelle nella diocesi di Alba e nel Roero fra alto medioevo ed età comunale', in E. Lusso – F. Panero (eds.), *Insediamenti umani*: 31-90.

Panhuysen T. (ed.), *Transformations in North-Western Europe (AD 300-1000)* (Hannover 2011).

Pani Ermini L. (ed.), *Teoria e pratica del lavoro nel monachesimo altomedievale* (Spoleto 2015).

Panizza M., Carton A., Piacente S. (eds.), *I.G.U. Commission on Geomorphological Survey and Mapping. Proceedings of the 15th plenary meeting* (Modena 1979).

Pantò G., 'Ceramiche altomedievali dai nuovi scavi di Torino', in Patitucci-Uggeri (ed.), *La ceramica altomedievale*: 37-58.

Pantò G., 'Moncalieri, fraz. Testona, loc. Castelvecchio. Testimonianze di età altomedievale', *QSAP* 18 (2001): 121-122.

Pantò G., 'Settime di Desana: un insediamento altomedievale tra Vercelli e Trino', *QSAP* 17 (2000): 111-158.

Pantò G., 'Produzione e commercio di vasellame d'uso domestico tra la fine del mondo antico e il Medioevo', in Marcando–Micheletto (eds.), *Archeologia Piemonte*: 282-283.

Pantò G. (ed.), *Produzione e circolazione dei materiali ceramici in Italia settentrionale tra VI e X secolo* (Mantova 2004).

Pantò G. *et al*., 'Un nucleo di sepolture longobarde a Villa Lancia di Testona', *QSAP* 28 (2013): 89-118.

Pantò G. – Occelli F., 'Moncalieri, fraz. Testona, parco di Villa Lancia. Abitato e necropoli di et longobarda', *QSAP* 24 (2009): 229-234.

Paroli L. (ed.), *L'Italia centro-settentrionale in età longobarda* (Florence 1997).

Pasquali G., 'L'azienda curtense e l'economia rurale dei secoli VI-XI', in A. Cortonesi *et al*. (eds.), *Uomini e campagne*: 3-71.

Pasquali G., *Contadini e signori della Bassa Insediamenti e 'deserta' del Ravennate e del Ferrarese nel Medioevo* (Bologna 1995).

Pasquali G., 'Le forme dell'organizzazione del territorio rurale nella Pentapoli altomedievale', *Atti e Memorie della Deputazione di Storia Patria per le Marche* 86 (1981): 647-682.

Pasquali G., 'La distribuzione geografica delle cappelle e delle aziende rurali descritte nell'inventario altomedievale del monastero di S. Giulia di Brescia', in V. Frati *et al*. (eds.), *San Salvatore di Brescia*: 142-167.

Passi Pitcher L., 'Archeologia della colonia di Cremona: la città e il territorio', in P. Tozzi (ed.), *Storia di Cremona*: 130-229.

Patitucci-Uggeri S., 'Introduzione', in Id. (ed.), *La ceramica altomedievale*: 7-10.

Patitucci-Uggeri S., 'Introduzione', in Id. (ed.), *La viabilità medievale in Italia*: VII-VIII.

Patitucci-Uggeri S., 'La viabilità di terra e d'acqua nell'Italia medievale', in Id. (ed.), *La viabilità medievale in Italia*: 1-19.

Patitucci-Uggeri S. (ed.), *La ceramica altomedievale in Italia* (Florence 2004).

Patitucci-Uggeri S. (ed.), *La via Francigena e altre strade della Toscana medievale* (Florence 2004).

Patitucci-Uggeri S. (ed.), *La viabilità medievale in Italia. Contributo alla carta archeologica medievale* (Florence 2003).

Patitucci-Uggeri S., *Carta archeologica medievale del territorio ferrarese I, Forma Italiae Medii Aevi* (Ferrara 2002).

Patitucci-Uggeri S., *Carta archeologica medievale del territorio ferrarese II, Le vie d'acqua in rapporto al nodo idroviario di Ferrara* (Florence 2002).

Patitucci-Uggeri S., 'Aspetti dell'insediamento lagunare a nord di Ravenna tra Tardoantico e Medioevo', in *Seminario giustinianeo* 30 (1983): 391-433.

Patitucci-Uggeri S., 'Il castrum Ferrariae', in N. Alfieri (ed.), *Insediamenti nel Ferrarese*: 153-158.

Patitucci-Uggeri S., 'Scavi nella Ferrara medioevale. Il *castrum* e la seconda cerchia', *ArchMed* 1 (1974): 111-47.

Patitucci-Uggeri S., 'Un'evidenza archeologica per il medievale *castrum Ferrariae*', *Bollettino Annuale dei Musei Ferraresi* 3 (1973): 85-92.

Pauli L., *The Alps. Archaeology and Early History* (London 1984).

Pearce M., 'Le città fallite. Considerazioni sulla robustezza delle istituzioni cittadine', *Athenaeum* 95/2 (2007): 815-818.

Pearce M. *et al*., 'A multidisciplinary investigation of Roman bricks from the Torre Civica – Pavia (NW Italy)', *Science and Technology for Cultural Heritage* 5/2 (1996): 19-27.

Pearce M., *Il Territorio di Milan e Pavia tra Mesolitico e prima Età del Ferro. Dalla carta archeologica alla ricostruzione del paesaggio* (Florence 1994).

Pellegrini M., 'Evoluzione della rete idrografica e dell'alveo del Po', in I. Ferrari – M. Pellegrini (eds.), *Un Po di carte*: 33-50.

Pellegrini M., 'The Po valley: methods of study, geological characteristics and example of geomorphological evolution', in M. Panizza *et al*. (eds.), *I.G.U. Commission on Geomorphological Survey and Mapping*: 83-101.

Perboni M. (ed.), *Terre di confine: il territorio di San Giovanni del Dosso e del destra Secchia nel Medioevo* (San Giovanni del Dosso 2003).

Peytremann É. (ed.), *Des Fleuves et des Hommes à l'époque mérovingienne. Territoire fluvial et société au premier Moyen Âge (Ve-XIIe siècle)* (Dijon 2016).

Pinna M., *Il clima nell'alto Medioevo*, *Settimane* 37 (1990): 431-459.

Pirenne H., *Mahomet et Charlemagne* (Paris-Bruxelles 1937).

Pirenne H., 'Mahomet et Charlemagne', *Revue Belge de Philologie et d'Histoire* 1 (1922): 77-86.

Poláček L. (ed)., *Studien zum Burgwall von Mikulčice VII* (Brno 2005).

Poláček L. (ed.), *Studien zum Burgwall von Mikulčice V* (Brno 2003).

Poláček L. – Marek O., 'Grundlagen der Topographie des Burgwalls von Mikulčice. Die Grabungsflächen 1954–1992', in L. Poláček (ed)., *Studien zum Burgwall VII*: 9-358.

Racine P., 'La forêt dans l'économie du monastère de Bobbio', in J.P. Chabin (ed.), *La forêt*: 187-201.

Racine P., 'Associations de marchands et associations de métiers en Italie de 600 à 1200', in B. Schwineköper (ed.), *Gilden und Zünfte*: 127-149.

Racine P., 'Dalla dominazione longobarda all'anno mille', in *Storia di Piacenza 1*: 177-264.

Racine P., 'Il Po e Piacenza nel Medio Evo. Per una storia economica e sociale della navigazione padana', *Bollettino Storico Piacentino* 63 (1968): 26-37.

Raftery B. – Hickey J. (eds.), *Recent development in wetland research* (Dublin 2001).

Rao R., 'Abitare, costruire e gestire uno spazio fluviale: signori, villaggi e beni comuni lungo la Sesia tra Medioevo ed età moderna', in Id. (ed.), *I paesaggi fluviali*: 13-30.

Rao R., *I paesaggi dell'Italia medievale* (Rome 2015).

Rao R. (ed.), *I paesaggi fluviali della Sesia fra storia e archeologia. Territori, insediamenti, rappresentazioni* (Florence 2016).

Rapone F., *Il mercato nel regno d'Italia (VIII-metà dell'XI secolo): archeologia e storia*, PhD Thesis (EHESS Paris – University Ca' Foscari Venezia 2011).

Ravazzi C. *et al*., 'Lake evolution and landscape history in the lower Mincio River valley, unravelling drainage changes in the central Po Plain (Northern Italy) since the Bronze Age', *Quaternary International* 288 (2013): 195-205.

Redi F. – Forgione A. (eds.), *VI Congresso Nazionale di Archeologia Medievale* (Florence 2012).

Reuter T., 'The Insecurity of Travel in the Early and High Middle Ages: Criminals, Victims and their Medieval and Modern Observers', in J. Nelson (ed.), *Medieval Polities*: 38-71.

Rinaldi R., *Dalla via Emilia al Po. Il disegno del territorio e i segni del popolamento (secc. VIII-XIV)* (Bologna 2005).

Rinaldi R., 'Paludi e peschiere nella bassa pianura padana tra alto e pieno medioevo', in B. Andreolli – G. Mantovani (eds.), *Gavello e San Martino Spino*: 85-116.

Rippon S., 'Water and wetlands in medieval estate management: Glastonbury Abbey, Meare and the Somerset Levels in South West England', *Ruralia* 5 (2005): 93-112.

Rohmer P. *et al*., 'Les moulins carolingiens (IXe-Xe siècles) d'Audun-le-Tiche (Moselle)', in L. Jaccottey – G. Rollier (eds.), *Archéologie des moulins hydrauliques*: 303-322.

Rohmer P., 'Le moulin carolingien d'Audun-le-Tiche', *Archéologie nouvelle* 22 (1996): 6-8.

Romano G., 'Pavia nella storia della navigazione fluviale', *Bollettino della Società Pavese di Storia Patria* 11 (1911): 311-328.

Romano R. – Tucci U. (eds.), *Storia d'Italia. Economia naturale, economia monetaria* (Torino 1983).

Romanoni F., 'Note sul porto di Sclavaria di Pavia', *Bollettino della Società Pavese di Storia Patria* 104 (2004): 247-264.

Rossetti G., *Società e istituzioni nel contado lombardo durante il medioevo. Cologno Monzese, I (secoli VIII-X)* (Milan 1968).

Rossi P. (ed.), *Modelli di città. Strutture e funzioni politiche* (Torino 1987).

Rossini E., *I livelli di Ostiglia nel secolo IX. Contributi alla storia dell'agricoltura veronese* (Verona 1979).

Rossignoli C. *et al*., 'Cesana di Lentiai. Indagini archeologiche preliminari in un sito altomedievale', *NAVe* 2 (2013): 15-21.

Rottoli M., 'Reflections on Early Medieval resources in northern Italy: the archaeobotanical and archaeozoological data', *Quaternary International* 346 (2014): 20-27.

Rovelli A., 'Gold, silver, and bronze: an analysis of monetary circulation', in S. Gelichi – R. Hodges (eds.), *From one sea*: 267-296.

Rovelli A., 'Coins and trade in early medieval Italy', *EME* 17/1 (2009): 45-76.

Rovelli A., 'Some Considerations on the Coinage of Lombard and Carolingian Italy', in L. Hansen – C. Wickham (eds.), *The Long Eighth Century*: 195-224.

Rucco A.A., *Comacchio nell'Alto Medioevo. Il paesaggio tra topografia e geoarcheologia* (Florence 2015).

Saggioro F., 'Paesaggi in equilibrio: uomo e acqua nella Pianura Padana Centrale tra IV e IX secolo', *AnTard* 20 (2012): 47-67.

Saggioro F., 'L'area e la sequenza di scavo', in Id., (ed.), *Nogara*: 53-76.

Saggioro F., 'Abitati altomedievali in legno nella pianura Veronese: problemi e temi della ricerca', in P. Galetti (ed.), *Edilizia residenziale*: 75-90.

Saggioro F., *Paesaggi di pianura: trasformazioni dell'insediamento tra età Romana e medioevo. Insediamenti, società, ambiente nella pianura tra Mantova e Verona* (Florence 2010).

Saggioro F., 'Ricognizioni, paesaggi ed esperienze di ricerca nei territori di pianura tra Veneto e Lombardia', in N. Mancassola – F. Saggioro (eds.), *Medioevo*: 65-86.

Saggioro F., 'Tra terra e acqua: problemi dell'insediamento e dell'ambiente nei territori di pianura', in R. Francovich – M. Valenti (eds.), *IV Congresso*: 206-212.

Saggioro F., 'Insediamenti, proprietà ed economie nei territori di pianura tra Adda e Adige (VII-X secolo)', in G.P. Brogiolo *et al*. (eds.), *Dopo la fine delle ville*: 81-104.

Saggioro F., 'Insediamento e monasteri nella pianura veronese tra VIII e XIII secolo', in R. Francovich – S. Gelichi (eds.), *Monasteri e castelli*: 169-182.

Saggioro F. (ed.), *Nogara. Archeologia e storia di un villaggio medievale (Scavi 2003-2008)* (Rome 2011).

Saggioro F. *et al*., 'Il Monastero di Leno (BS): indagini archeologiche (2009-2015) e prime riflessioni sul contesto di scavo', *Temporis signa* 10 (2016): 1-24.

Saggioro F. *et al*., 'Alcuni dati e considerazioni sull'insediamento d'età medievale nel veronese. Il caso di Nogara (secoli IX-XIII)', in *ArchMed* 27 (2001): 465-495.

Saggioro F. *et al*. (eds.), *Il Monastero di San Benedetto di Leno. Archeologia di un paesaggio in età medievale* (Florence 2019).

Saggioro F. – Mancassola N., 'Paesaggi medievali di pianura: considerazioni e risultati preliminari sul progetto Ghisione-Villa Poma (MN)', *Quaderni di Archeologia del Mantovano* 6 (2004): 75-84.

Saggioro F. – Varanini G.M., 'Ricerche sul paesaggio e sull'insediamento d'età medievale in area veronese', in S. Lusuardi Siena (ed.), *Dalla curtis alla pieve*: 101-160.

Salisbury C.R., 'Primitive British fish-weirs', in G.L. Good *et al*. (eds.), *Waterfront Archaeology*: 76-87.

Salvatori F., 'The transition from late antiquity to early Middle Ages in Italy. A zooarchaeological perspective', *Quaternary International* 499 (2019): 35-48.

Salvadori F., 'La pesca nel Medioevo: le evidenze della cultura materiale', *Atti del Convegno Nazionale di Archeozoologia* 6 (2012): 297–305.

Salvadori F., 'Zooarcheologia e controllo delle risorse economiche locali nel medioevo', *PCA* 1 (2011): 195-244.

Sanchez-Pardo J.C. *et al*. (eds.), *Ecclesiastical Landscapes in Medieval Europe. A Comparative Approach* (Oxford forthcoming).

Sannazzaro M., 'La ceramica invetriata tardo antica-altomedievale in Lombardia. Le produzioni più tarde', in S. Patitucci-Uggeri (ed.), *La ceramica altomedievale in Italia*: 103-118.

Sauer C.O., 'The Morphology of Landscape', *University of California Publications in Geography* 2 (1925): 19-53.

Sbarra F., 'La ceramica di un villaggio di X secolo nell'area padana: produzione e circolazione', in Curina–Negrelli (eds.), *1º Incontro*: 95-124.

'Scavi e interventi archeologici a Comacchio con fasi di età altomedievale', in Berti *et al*. (eds.), *Genti nel delta*: 485-488.

Schmidt G., *Atlante aerofotografico delle sedi umane in Italia. La centuriazione Romana* (Florence 1989).

Schmid K., 'Zur Ablösung der Langobardensherschaft durch die Franken', *Quellen u. Forsch*. 52 (1972): 1-36.

Schwineköper B. (ed.), *Gilden und Zünfte. Kaufmännische und gewerbliche Genossenschaften im frühen und hohen Mittelalter* (Sigmaringen 1985).

Serafini – A. Manicardi (eds.), *Il sistema fluviale Scoltenna-Panaro: storie d'acque e di uomini. Atti del convegno, Nonantola 10-12 marzo 1988* (Nonantola 1988).

Settia A.A., 'Pavia carolingia e postcarolingia', in *Storia di Pavia 2*: 69-159.

Sigl M. *et al*., 'Timing and climate forcing of volcanic eruptions for the past 2,500 years', *Nature* 523 (2015): 543-549.

Sogliani F. *et al*. (eds.), *VIII Congresso nazionale di archeologia medievale* (Florence 2018).

Soldi F., *La capitale del Po: Cremona* (Cremona 1957).

Solmi A., 'L'antico porto di Milan', *Archivio Storico Lombardo* 54 (1927): 457-474.

Solmi A., 'Le diete imperiali di Roncaglia e la navigazione del Po presso Piacenza', *Archivio Storico delle Province Parmensi n.s.* 10 (1910): 18-45.

Somma M.C. (ed.), *Cantieri e Maestranze nell'Italia Medievale. Atti del Convegno di studio, Chieti - San Salvo, 16 - 18 maggio 2008* (Spoleto 2010).

Spreti C., *Notizie spettanti all'antichissima Scola de' Pescatori in oggi denominata casa Matha* (Ravenna 1820).

Squatriti P., *Landscape and Change in Early Medieval Italy: Chestnuts, Economy, and Culture* (Cambridge 2013).

Squatriti P., 'The Floods of 589 and Climate Change at the Beginning of the Middle Ages: An Italian Microhistory', *Speculum* 85/4 (2010): 799-826.

Squatriti P., 'I pericoli dell'acqua nell'alto medioevo italiano', *Settimane* 55 (2008): 583-629.

Squatriti P., *Water and society in early medieval Italy, AD 400-1000* (Cambridge 2002).

Squatriti P. (ed.), *Working with water in medieval Europe. Technology and Resource-Use* (Leiden-Boston-Koln 2000).

Stasolla F.R., 'Le Alpi cerniera tra popoli e culture: le vie di lunga percorrenza', in *Carlo Magno e le Alpi*: 253-268.

Stefani M. – Vincenzi S., 'The interplay of eustasy, climate and human activity in the late quaternary depositional evolution and sedimentary architecture of the Po Delta system', *Marine Geology* 222-223 (2005): 19-48.

Stefani M. – Zuppiroli M., 'The interaction of geological and Anthropic processes shaping the urban growth of Ferrara and the evolution of the surrounding plain', *Il Quaternario* 23/2Bis (2010): 355-372.

Storia di Milan VIII (Milan 1957).

Storia di Pavia 2. L'Alto Medioevo (Milan 1987).

Storia di Pavia 1. L'età antica (Pavia 1984).

Storia di Piacenza. Dalle origini all'anno mille 1 (Piacenza 1990).

Succurro M.C., *L'abbazia di San Benedetto di Leno (secoli VIII-XV). Istituzione, relazioni, aspetti patrimoniali*, PhD Thesis (Università degli studi di Florence 2012).

Swaffield S., 'Landscape as a way of knowing the world', in S. Harvey – K. Fieldhouse (eds.), *The cultured landscape*: 3-24.

Szabò T., *Comuni e politica stradale in Toscana e in Italia nel Medioevo* (Bologna 1992).

Szabò T., 'Xenodochi, ospedali e locande: forme di ospitalità ecclesiastica e commerciale nell'Italia del Medioevo (secoli VII-XIV)', in Id., *Comuni e politica stradale*: 285-319.

Tabacco G., 'La città vescovile nell'Alto Medioevo', in P. Rossi (ed.), *Modelli di città*: 327-345.

Talbert R.J.A. (ed.), *Barrington Atlas of the Greek and Roman World* (Princeton 2000).

Thoen E., Borger G.J., de Kraker A.M. (eds.), *Landscapes or seascapes? The history of the costal environment in the North Sea area reconsidered* (Turnhout 2013).

Tinazzi O. – Lerco E., 'Indagine Xilotomica e Dendrocronologica su elementi lignei provenienti dallo scavo «Mulino di Sotto» di Nogara (VR): approccio metodologico e relazione preliminare', in F. Saggioro (ed.), *Nogara*: 77-88.

Toubert P., 'Il sistema curtense: la produzione e lo scambio interno in Italia nei secoli VIII, IX e X', in R. Romano – U. Tucci (eds.), *Storia d'Italia*: 5-63.

Toubert P., 'Le strutture produttive nell'alto medioevo: le grandi proprietà e l'economia curtense', in N. Tranfaglia – M. Firpo (eds.), *La Storia I*: 51-89.

Tozzi P., 'Il territorio di Ticinum Romana', in *Storia di Pavia 1*: 151-182.

Tozzi P., 'L'impianto urbano di Ticinum Romana', in *Storia di Pavia 1*: 183-204.

Tozzi P., *Saggi di topografia storica* (Florence 1974).

Tozzi P., *Storia padana antica. Il territorio fra Adda e Mincio* (Milan 1972).

Tozzi P., 'Viabilità di età Romana fra Cremona e Brixia', in Id., *Saggi di topografia*: 61-70.

Tozzi P. (ed.), *Storia di Cremona: l'Età Antica* (Azzano S. Paolo 2003).

Tranfaglia N. – Firpo M. (eds.), *La Storia I, il Medioevo* (Torino 1988).

Turner R., 'Fish weirs and fish trap', in A. Davidson (ed.), The Coastal Archaeology: 95-108

Uggeri G., 'La nascita di Ferrara: il quadro topografico e storico', in *Anno 413*: 119-130.

Uggeri G., '"La Romanizzazione dell'antico delta padano" 40 anni dopo: una revisione', *Atti dell'Accademia delle Scienze di Ferrara* 93 (2015-2016), 79-104.

Uggeri G., *Carta archeologica del territorio ferrarese: Comacchio* (Lecce 2006).

Uggeri G., *Carta archeologica del territorio ferrarese: Ferrara* (Galatina 2002).

Uggeri G., 'Insediamenti, viabilità e commerci di età Romana nel Ferrarese', in *Storia di Ferrara 3/1* (Ferrara 1989): 1-202.

Uggeri G., 'La navigazione interna della cisalpina in età romana', "*Antichità Altoadriatiche* 29/2 (1987): 305-354.

Uomo e spazio nell'alto Medioevo, *Settimane* 50 (Spoleto 2003).

Vaccari P., 'Pavia nell'altomedioevo', in *Settimane* 6 (1959): 151-1192.

Vaccaro E., *Sites and Pots: Settlement and Economy in southern Tuscany (AD 300-900)* (Oxford 2011).

Valenti M., *L'insediamento altomedievale nelle campagne toscane, Paesaggi, popolamento e villaggi tra VI e X secolo* (Florence 2004).

Van Zeist W. (ed.), *Progress in Old World Paleoethnobotany* (Rotterdam 1991).

Valenti M. –Wickham C. (eds.), *Italy, 888-962: a turning point* (Turnhout 2013).

van Dam P.J.E.M., 'An Amphibious Culture. Coping with floods in the Netherlands', in P. Coates *et al*. (eds.), *Local Places*: 78-93.

van Es W.A. – Verwers W.J.H. (eds.), *Excavations at Dorestad 3* (Amersfoort 2009).

Varaldo C., 'La ceramica altomedievale in Liguria (VIII-X secolo)', in S. Patitucci-Uggeri, *La ceramica altomedievale*: 119-148.

Varanini G.M. – Saggioro F., 'Ricerche sul paesaggio e sull'insediamento d'età medievale in area veronese', in S. Lusuardi Siena (ed.), *Dalla curtis alla pieve*: 141-145.

Venturino Gambari M. *et al*., 'Tortona, via Saccaggi – corso Repubblica. Resti del porto fluviale di età Romana e impianti artigianali postmedievali', *QSAP* 26 (2011): 163-169.

Verhulst A., *The Rise of Cities in North-West Europe* (Cambridge 1999).

Violante C., *La società milanese nell'età precomunale* (Bari 1953).

Vocino G., *Santi e luoghi santi al servizio della politica carolingia (774-877): Vitae e Passiones del regno italico nel contesto europeo*, PhD Thesis (University Ca' Foscari Venice 2010).

Volpe G. – Favia P. (eds.), *V Congresso Nazionale di Archeologia Medievale* (Florence 2009).

Xoplaki E. *et al*., 'Modelling Climate and Societal Resilience in the Eastern Mediterranean in the Last Millennium', *Human Ecology* 46 (2018): 363-379.

Wanner H., Solomina O., Grosjean M., Ritz S.P., Jetel M., 'Structure and origin of Holocene cold events', *Quaternary Science Reviews* n. 30 (2011): 3109-3123.

Ward-Perkins B., 'Continuists, catastrophists and the town of post-Roman Northern Italy', *PBSR* 45 (1997): 156–176.

Ward-Perkins B., 'The towns of northern Italy: rebirth or renewal?', in R. Hodges – B. Hobleys (eds.), *The rebirth*: 16-27.

Watts M., *The Archaeology of Mills and Milling* (Stroud 2002).

Went A.E.J., 'Material for a History of the Fisheries of the River Boyne', *Journal of the County Louth Archaeological Society* 13 (1953): 18-33.

Werther L. – Kröger L., 'Medieval inland navigation and the shifting fluvial landscape between Rhine and Danube (Germany)', *PCA* 7 (2017): 65-96.

White K., *Greek and Roman Technology* (Ithaca 1984).

Wickham C., 'Rethinking the Structure of the Early Medieval Economy', in J.R. Davis - M. McCormick (eds.), *The Long Morning*: 19-31.

Wickham C., *Framing the Early Middle Ages: Europe and the Mediterranean*, 400–800 (New York 2005).

Wickham C., 'European forests in the early Middle Ages: landscape and land clearance', *Settimane* 37 (1990): 479-548.

Wickham C., 'Considerazioni conclusive', in R. Francovich – G. Noyé (eds.), *La storia*: 741-759.

Wikander O., 'Archaeological Evidence for Early Water-Mills, An Interim Report', *History of Technology* 10 (1985): 151-179.

Wilson D.M. (ed.), *The archaeology of Anglo-Saxon England* (Cambridge 1976).

Williams D. – Peacock D. (eds.), *Bread for the People: the Archaeology of Mills and Milling* (Oxford 2011).

Winkler K., *Die Alpen im Frühmittelalter. Die Geschichte eines Raumes in den Jahren 500 bis 800* (Köln 2012).

Yu H. *et al*., 'The Fertilizing Role of African Dust in the Amazon Rainforest: A First Multiyear Assessment Based on CALIPSO Lidar Observations', *Geophysical Research Letters* 42 (2015): 1984-1991.

Zagnoni R., ‘La montagna fra Bologna e Pistoia dall’Alto Medioevo al secolo XI’, in Id. (ed.), *La montagna*: 39-44.

Zagnoni R. (ed.), *La montagna fra Bologna e Pistoia fra Età antica e alto Medioevo* (Porretta Terme 1999).

Zielhofer C. *et al*., ‘Charlemagne's Summit Canal: An Early Medieval Hydro-Engineering Project for Passing the Central European Watershed’, *PLoS ONE* 9/9 (2014): 1-20.

Zimolo G.C., ‘Bergamo e Brescia nella storia della navigazione interna’, *Archivio Storico Lombardo* 91 (1964): 362-394.

Zimolo G.C., *La navigazione nel Comasco dalle origini ai giorni nostri* (Milan 1962).

Zimolo G.C., ‘Canali e navigazione interna tra Lambro e Adda nel territorio lodigiano’, *Archivio Storico Lombardo* 85 (1958): 221-232.

Zimolo G.C., ‘Canali e navigazione interna delle origini al 1500’, in *Storia di Milano VIII*: 865-895.

Zimolo G.C., ‘Pavia nella stona della navigazione interna’, *Atti Congresso Storico Lombardo* 4 (1940): 493-534.

Zimolo G.C., ‘Cremona nella stona della navigazione interna’, *Atti Congresso Storico Lombardo* 3 (1938): 221-266.

Zimolo G.C., ’Piacenza nella storia della navigazione interna’, *Atti Congresso Storico Lombardo* 3 (1938): 168-195.