Daria Ageeva

REGULATION OF FISHERIES AND FISH CONSUMPTION IN THE EARLY MODERN VENETIAN REPUBLIC

MA Thesis in Comparative History, with a specialization
in Late Antique, Medieval, and Renaissance Studies.

Central European University Private University

Vienna

May 2022

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by

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(Russian Federation)

Thesis submitted to the Department of Medieval Studies,

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Accepted in conformance with the standards of the CEU.

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Author's declaration

I, the undersigned, **Daria Ageeva**, candidate for the MA degree in Comparative History, with a specialization in Late Antique, Medieval, and Renaissance Studies, with a specialization in Interdisciplinary Medieval Studies declare herewith that the present thesis is exclusively my own work, based on my research and only such external information as properly credited in notes and bibliography. I declare that no unidentified and illegitimate use was made of the work of others, and no part of the thesis infringes on any person's or institution's copyright. I also declare that no part of the thesis has been submitted in this form to any other institution of higher education for an academic degree.

Vienna, 18 May 2022

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Abstract

Fishing on the lagoon is one of the most ancient "crafts" of the Venetian population which significantly impacted the environment of the lagoonal city. It provided sustenance for all strata of the Venetian society and employed a significant part of it in the production and distribution of fish. Especially important during Lenten and Advent time when meat was banned from diet by the religious prescriptions, fish was widely consumed in Venice on everyday basis. Such important economic activity was extensively regulated by the Venetian authorities from the late Middle Ages in relation to both production and distribution sectors. The existent historiography on the Venetian aquatic resource use usually presents it as a successful history of preindustrial sustainable management. However, a thorough analysis of the fifteenth-sixteenth century sources reveals the growing issues with local fish supply which in the following centuries led to the increasing dependence of the Republic on the fish export from the Atlantic, Balkan, and Ferrarese fisheries. Drawing upon administrative sources and historical ecological data, I address ecological and socio-economic processes whose interplay caused this fish crisis in the early modern Venetian Republic proving that the premodern environmental legislation was not sufficient to prevent fish stock depletion and to cope with increasing climate volatility.

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List of Abbreviations

ASVe – *Archivio di Stato di Venezia*

BMC – *Biblioteca del Museo Correr*

BNM – *Biblioteca Nazionale Marciana*

GV – *Giustizia Vecchia*

SEA – *Savi ed esecutori alle acque*

Introduction

This thesis deals with the possible environmental impacts of fishing regulations and fish consumption in the heyday of the Venetian Republic (fifteenth–sixteenth centuries). Fish was a staple food for the population of the Venetian Lagoon marked as such in the very first known mention of Venice by Cassiodorus who described the sixth century Venetians as "gorging themselves with fish" and extracting salt, "instead of driving the plough or wielding the sickle".[1] Over the centuries, the wealth of the Venetians grew, and their diet became increasingly varied as they pushed the ecological boundaries of natural systems along with their economic expansion. Fish, however, provided an important source of protein for both nobility and *popolani* throughout Venetian history, especially during Lenten time. The State Archive of Venice is abundant with regulations issued by the Venetian authorities in managing fishing gear and seasons, fishermen's fraternities, and the fishmongers' guild. Starting with the sixteenth century, the topos of *carestia*, hunger, became particularly reinforced in these documents making part of a general growing anxiety over the alluviation of the lagoon. Thus, in the following chapters I address ecological and economic processes whose interplay affected both social and natural environment of the Venice Lagoon and assess the alleged 'sustainability' of the pre- and early modern fishing in one of the most populated cities of the time.[2]

The existent historiography on fishing in Venice is scarce despite the fact that fishing was one of the city's oldest crafts with tangible impact on the local economy, environment and daily life. Piero Bevilacqua wrote one of the pioneering and most cited studies which considers

[1] Cassiodorus, "Letter 24, Book XII," *The Letters of Cassiodorus Being a Condensed Translation of The* Variae Epistolae *of Magnus Aurelius Cassiodorus Senator*," transl. Thomas Hodgkin (London: Henry Frowde, 1886), 517.

[2] In Venice, the population rapidly recovered after the Black Death and reached 100,000 by the beginning of the sixteenth century. In the following decades, this number may well have risen by appr. 50% to about 175,000: Brian Pullan, "Food for the City," *Venice. A Documentary History, 1450-1630*, ed. David Chambers, Brian Pullan (Oxford: Blackwell Publishers, 1992), 105-106.

the Venetian management of aquatic sources in general.[3] His book is predominantly based on contemporarily printed and published material and employs a timeless perspective, i.e. the "environmental" legislation is given as a continuous tradition for the whole history of the Venetian Republic without contextualisation of its increasingly sophisticated provisions in the changing social and natural environment.[4] Although disregarding changes in the environment of the Venice Lagoon, Bevilacqua presented the case of the Venetian aquatic source management as an example of pre-modern sustainability. His conclusions were adopted by the group of historical ecologists and natural scientists led by Tomaso Fortibuoni.[5] Their primary interests lay in the Habsburgs' period of the Venetian history which they consider as a decline in fishing management stemmed from the abandonment of the Republican legislative heritage, dissolution of the fishermen's fraternities, and subsequent overfishing. Seconding Bevilacqua, they describe the pre-Napoleonic period in idealistic terms:

> "The successful environmental management of the Serenissima was based on the far-seeing and severe legislation implemented and enforced by the authority, which promoted the public interest instead of private ones, reaching an equilibrium between the economic freedom of citizens and the protection of collective resources."[6]

Interestingly, it was an economic history study of Fabien Faugeron that traced first signs of the overfishing crisis back to the fifteenth century.[7] Faugeron argues that increasing regulation of the lagoonal fishponds in relation to the use of reed fences (*grisiole*) and growing

[3] Piero Bevilacqua, *Venezia e le acque. Una metafora planetaria* (Roma: Donzelli Editore, 1998).
[4] The volume *La pesca nella Laguna di Venezia* employs the same approach that by no means can considered historically accurate. However, this governmental edition of the Province of Venice offers a wide range of ethnographic data and cites historical sources otherwise unavailable to the author of this thesis: *La pesca nella Laguna di Venezia*, ed. Gianfranco Dogliani, Diego Birelli (Venice: Albrizzi Editore, 1982 [1981]).
[5] Tomaso Fortibuoni *et al*., "The Progressive Deregulation of Fishery Management in the Venetian Lagoon after the Fall of the *Repubblica Serenissima*: Food for Thought on Sustainability," *Global Bioethics* 25/1 (2014), 42-55; Tomaso Fortibuoni *et al*., "Fish and Fishery Historical Data since the 19th Century in the Adriatic Sea, Mediterranean, " *Scientific Data* 4 (2017). Access: https://www.nature.com/articles/sdata2017104; *Un altro mare. La pesca in Alto Adriatico e Laguna di Venezia dalla caduta della Serenissima ad oggi: un'analisi storica ed ecologica,* ed. Tomaso Fortibuoni, Otello Giovanardi, Sasha Raicevich (Chioggia: Tegnue di Chioggia, 2009).
[6] Fortibuoni, "The Progressive Deregulation," 45.
[7] Fabien Faugeron, *Nourrir la ville. Ravitaillement, marchés et métiers de l'alimentation à Venise dans les derniers siécles du Moyen Âge* (Rome: École Française de Rome, 2014).

dependence of the Venetian fishpond owners on breeding of fish and sylvatic ducks instead of hunting speaks for the progressing stock depletion, already palpable for the contemporaries.[8] On the other hand, Elisabeth Crouzet-Pavan attributed the recurrent bans on the reed hurdles to the concern of the Venetian governing bodies about the proliferation of marshes in the lagoon, as these constructions essential for fishing were believed to impede waterflow in the lagoon.[9] Her argument seems more probable, as the comparison between the fourteenth- and fifteenth-century fishing regulations does not reveal any substantial signs of overfishing (see Chapter 3). Crouzet-Pavan, too, asserts the hypothesis of the successful management of the aquatic resources where public interests always prevailed over the private ones:

> "Ages of water struggles and ways of spreading [human influence] succeeded each other in medieval Venice, but sustainable opposition always resulted in unity and cohesion, as the desire to exploit the territory created a unified social organism designed to carry out daily tasks."[10]

I shall demonstrate, however, that despite the persistent attempt on the side of the Venetian patricians to preserve fish stock for the city supply in long perspective, the sustainable management in pre-modern Venice nevertheless was not sufficient enough to prevent the overfishing crisis and the disintegration of fishermen's communities unfolded in the sixteenth century. Thus, I argue that the combined effects of the diversion of the Brenta River, recurring plague, the climatic extremes associated with the Little Ice Age, and economic stagnation badly affected both the social and natural environment of Venice long before the fall of the Republic.

This thesis takes on the topic of pre-modern sustainability and environmental legislation that has recently attracted a renewed attention in scholarship.[11] Although the concept of environment comes from a significantly later time, the Middle Ages knew a continous tradition

[8] Faugeron, *Nourrir la ville*, 315-316.
[9] Elisabeth Crouzet-Pavan, *Le Moyen Âge de Venise. Des eaux salées au miracle de pierres* (Paris: Albin Michel, 2015), 249-250.
[10] Crouzet-Pavan, *Le Moyen Âge de Venise*, 39.
[11] See: *Conservation's Roots. Managing for Sustainability in Preindustrial Europe, 1100–1800*, ed. Abigail P. Dowling and Richard Keyser (New York, Oxford: Berghahn Books, 2020).

of environmental legislation by local political powers.[12] At the time, the need to regulate the natural resource use was mostly understood in terms of public good (broadly defined) and legal rights (of varying degrees of exclusivity), and stemmed from the moral duty of a political authority to provide sustenance and defense for the community in long perspective and served to the affirmation of a given political authority. It is clearly seen in the case of Venetian forestry management thoroughly studied by Karl Appuhn.[13] Timber was a strategically important resource for the Venetians, ensuring, on the one hand, their maritime supremacy in the Mediterranean, and, on the other hand, satisfying the population's need for fuel and, as such, maintaining civil peace and tranquility. Appuhn argues that the Venetian forest policy aimed at the conservation of limited forest resources and *imitatio naturae*, although the complex mosaic of ecological, social, political, and economic structures the Venetians developed on the mainland by the sixteenth century inevitably alternated the natural landscape.[14] However, the Venetian fisheries regulations, aside from aforementioned works by Bevilacqua and Fortibuoni *et al*. which lack in sourcing and contextualization, have not yet been analyzed in terms of sustainability. Hence, methodology-wise this research follows the example of the studies of northern and western European fisheries,[15] particularly those by Richard Hoffmann. Hoffmann's long-term research introduces a broad panorama of inland fisheries regulations and fishing techniques with their long-term influence on the local ecologies of medieval western Europe. His studies do not only provide a comparative material for this thesis, but also inspire the approach employed in this work to the interplay of the ecological factors and economic

[12] Richard Keyser, Abigail P. Dowling, "Introduction," *Conservation's Roots. Managing for Sustainability in Preindustrial Europe, 1100–1800*, ed. Abigail P. Dowling and Richard Keyser (New York, Oxford: Berghahn Books, 2020), 9-12.
[13] Karl Appuhn, *A Forest on the Sea: Environmental Expertise in Renaissance Venice* (Baltimore: The Johns Hopkins University Press, 2009).
[14] Appuhn, *A Forest on the Sea*, 70-71.
[15] See among others: A. R. Michell, "The European Fisheries in Early Modern Time," *The Cambridge Economic History of Europe, vol. 5, The Economic Organization of Early Modern Europe* (London: Cambridge University Press, 1977), 133-184; Maryanne Kowaleski, "The Commercialization of the Sea Fisheries in Medieval England and Wales," *International Journal of Maritime History* 15/2 (2003), 177-231; Poul Holm *et al*., "The North Atlantic Fish Revolution," *Quaternary Research* (July 2019), 1-15.

exploitation in the management of aquatic resources in Venice. In addition, this work's methodology is informed by the community and moral economy studies.[16] Thus, this thesis explores the impacts fishing had on the environment of the Venetian Lagoon, and the changes in this environment which in turn affected the fisher's craft.

To examine these matters, this thesis draws upon written narratives and administrative sources, i.e. fishing regulations issued by various Venetian authorities in the fourteenth-sixteenth centuries. The provisions on inland and coastal fisheries where fish was widely understood as all aquatic animals including molluscs, amphibians, and mammals were commonly known in medieval Europe.[17] The Venetian fishing laws follow the general trend predominantly focusing on the lagoonal fishing leaving the open sea unsupervised with rare provisions on marine species appearing only from the late sixteenth century. These laws are abundantly found in the registry books of the Venetian Senate, the Great Council, the *Giustizia Vecchia* (Old Justice), and the *Cinque Savi sopra le Mariegole* (Five supervisors of the craft statutes) currently kept in the State Archive of Venice. Since some original documents were lost in time or not available for the consultation, the copy books from the Marciana Library and the Library of Museo Correr which contain summaries of craft regulations in thematic order provide significant help in reconstructing Venetian fishing legislation throughout centuries. These copies, however, expose only the essence of a regulation frequently omitting the reasoning behind it.

In order to understand the capture techniques extensively mentioned in the fishing laws, the ethnographic data was used. However, it should be kept in mind that traditional fishing techniques and equipment although preserved and to certain extent employed in the Venetian

[16] E. P. Tompson, "The Moral Economy of the English Crowd in the Eighteenth Century," *Past and Present* 50 (1971), 76-136; Roberto Zago, *I Nicolotti. Storia di una comunità di pescatori a Venezia nell'età mderna* (Venice: Francisci Editore, 1984).
[17] Richard Hoffmann, "Medieval Fishing," *Working with Water in Medieval Europe. Technology and Resource-Use,* ed. Paolo Squatriti (Leiden: Brill, 2000), 332.

lagoon nowadays experienced the influence of technological progress that brought engine-driven boats and new materials for the net weaving to the lagoon.

The early modern cookbooks amply printed in Venice play an important role in unravelling dietary habits of the Venetian elite. Unfortunately, the ichthyoarchaeological data that could allow for the comparison between written accounts and material signs of fish consumption is virtually non-existent for the period and location under study.

Since here fishing is essentially viewed as a commercial activity,[18] this thesis is organised according to the three main economic sectors, production, distribution, and consumption, although in reverse order, as it is important to first define the demand for fish that determined supply on the fish market and the scale of production, that is, fishing. Thus, first chapter addresses the fish consumption patterns mostly among the Venetian elites, as the absence of ichthyoarchaeological data does not allow for the reconstruction of dietary habits of other social strata. This last issue is to a certain extent alleviated by the information on prices and fish species on the Venetian fish market analysed in the second chapter. Finally, the third part constitutes the core of this thesis and deals with the environmental factors of fishing and reasons behind fish dearth in the second part of the sixteenth century.

[18] Recreational fishing and sustenance fishing, although known in the Venetian lagoon, are beyond the scope of this thesis.

Chapter 1: *Alla tavola Quaresimale*: Consumption of Fish[19]

In this chapter, I analyze the consumption patterns of fish, adhered to by the Venetian elite which consequently drove the market demand for certain species and, as I will argue in the third chapter, impacted the aquatic environment of the Venetian lagoon. Consumption depends on several factors, among which the local availability of species might not be the most important one, even in the late medieval — early modern context. As Richard Hoffmann has shown, starting from the High Middle Ages, the consumption of not-local "frontier" foods procured by means of long-distance trade expanded the boundaries of distant ecological systems.[20] The demand for these foods, whether they were subsistence fish like stockfish, or luxury goods like caviar, was shaped by cultural factors. Thus, the main aim of this chapter is to uncover the cultural aspects of fish consumption primarily using cookbook and tracts of the master of the house, the collection of instructions and advice for a steward in a noble household.

1.1 Cookbooks and their authors

Before printing, recipes were written down, copied, and changed by cooks for their apprentices or patrons to preserve the memory of lavish banquettes. One such manuscript is the mid-fourteenth century collection of recipes by an anonymous Venetian scribe/cook, preserved in at least three copies in northern Italian collections.[21] A later, fifteenth century cook Martino de Rossi composed his cookbook somewhere in 1460s preparing a presentation copy for the Patriarch of Aquileia, his patron. Possibly, Bartolomeo Platina read this manuscript and later

[19] "On the Lenten Table"
[20] Richard Hoffmann, "Frontier Foods for Late Medieval Consumers: Culture, Economy, Ecology," *Environment and History* 7 (2001), 154-155.
[21] Anonimo Veneziano*, Libra di cucina del secolo XIV,* ed. Ludovico Frati (Livorno, 1899).

incorporated it in his *De honesta voluptate et valetudine* (ca. 1475), the first printed cookbook.[22] As with earlier manuscripts, recipes were copied into other books by various authors without references, thus, Martino's recipes appear in 27 Italian editions attributed to Giovanni de Rosselli and Maestro Giovane.[23] The next big event in the Renaissance culinary world appeared with the publication of Messisbugo's *Banchetti* (1549).[24] The steward and later count palatine of the House of Este, he served dinners in Ferrara for more than twenty years and based his work, published posthumously, on personal experience. Personal experience and detailed description of food preparation are characteristics of another influential cookbook written by papal cook Bartolomeo Scappi (1571). Interestingly enough, all these renowned cooks, famous for their original recipe compilations, have connections to Venice either because they worked there at some time in their lives or lived close to the city of Saint Mark, occasionally serving dinners for the Venetian guests of their masters. Moreover, all the cookbooks were printed in Venice, if not first there, then at least in second editions.

Culinary practices of the medieval nobility were less region-specific than one might think. Obviously, cooks in noble households heavily depended on the availability of products on the market and those products varied according to season, climate, and social upheavals. However, both victuals, usually in preserved state, and recipes traveled together with cooks and their patrons across Europe sometimes preserving the name of their origin: Hungarian fish soup,[25] Pike pottage in the French fashion,[26] Sicilian macaroni,[27] etc. Although, cooks, as many other

[22] First printed between 1470-1475 in Rome and in 1475 in Venice. English translation: Platina, *On Right Pleasure and Goof Health*, Ed. and transl. Mary Milham (Tempe, 1998). On the connection between Marino de Rossi's presentation copy and Platina see: Bruno Lauroiux, "I libri di cucina italiani alla fine del Medioevo: un nuovo bilancio," *Archivio Storico Italiano* 152/1 (1996), 41-44.
[23] Deborah L. Krohn, *Food and Knowledge in Renaissance Italy. Bartolomeo Scappi's Paper Kitchens* (London, New York: Routledge, 2016), 9.
[24] Cristoforo Messisbugo, *Banchetti, compositione di vivande, et apprecchio generale* (Ferrara, 1549).
[25] Cristoforo Messisbugo, *Banchetti,* 62r.
[26] Bartolomeo Scappi, *The Opera of Bartolomeo Scappi (1570).* L'arte et prudenza d'un maestro cuoco. *The art and Craft of a Master Cook*, transl. Terence Scully (Toronto: University of Toronto Press, 2008), 330.
[27] Maestro Martino, "Libro de arte coquinaria*," Arte della cucina. Libri di ricette, testi sopra lo scalco, i trinciante e i vini. Dal XIV al XIX secolo*, Vol. 1, ed. Emilio Faccioli. Milan, 1966, 145. https://www.uni-giessen.de/fbz/fb05/germanistik/absprache/sprachverwendung/gloning/tx/martino2.htm. English translation:

medieval craftsmen, were organized in guilds or fraternities,[28] it did not prevent noblemen from bringing their private cooks wherever they traveled. For example, Martino de Rossi, born in the Blenio valley in present-day Switzerland, was employed in the kitchen of Duke Francesco Sforza in 1457. Later, he served Ludovico Trevisano, the Cardinal of Aquileia, in Rome, and the Milanese *condottiero*, Gian Giacomo Trivulzio. He may even have traveled as far as Naples.[29] Another cook, Bartolomeo Scappi, born in Dumenza in Lombardy at the beginning of the sixteenth century, served Cardinal Marin Grimano in Venice. He may have traveled with Grimano as far as Ravenna and Aquileia. He secured his connection to the Venetian cardinals later when he worked in Rome where he occasionally cooked for Venetian Cardinals Pietro Bembo and Andrea Cornaro. He reached his career peak as a private cook for Pope Pius V. After the pope's death in 1572, Scappi, now elevated in social status to Lateran count and knight was, apparently, less active professionally.[30] Finally, Messisbugo, although he stayed in service of the Este family for twenty years, traveled with his masters across northern Italy and served dinners for the Venetian ambassadors and other 'foreign' elites. Thus, cooks had an opportunity to learn local culinary practices which they subsequently disseminated throughout Europe, making noble diet relatively homogeneous.

Who was the audience for the early modern cookbooks? Testimonies show that they were bought and read by both nobility and their stewards. For instance, Deborah Krohn discovered two representative copies of Scappi's book: one, lavishly decorated, well-preserved edition with Catherine de Medici's coat of arms, does not contain any visible trace of use. However, the other edition, now in poor state, has marginal commentaries made by a certain Marcantonio,

Martino of Como, *The Art of Cooking. The First Modern Cookery Book,* ed. Luigi Ballerini, transl. Jeremy Parzen (Los Angeles: University of California Press, 2005).

[28] Terence Scully, *The Art of Cookery in the Middle Ages* (Woodbridge: The Boydell Press, 1995), 236-237. In Venice, the documentation of cooks' guild is preserved only from the late seventeenth century.

[29] Lauroiux, "I libri di cucina", 47-48.

[30] Deborah L. Krohn, *Food and Knowledge,* 5-7; Terence Scully, "Introduction," *The Opera of Bartolomeo Scappi (1570*), 12-25.

supposedly a steward of a noble household, somewhere in central Italy.[31] Moreover, at the end of the sixteenth century, Italian encyclopedist Tomaso Garzoni in his *La piazza universale di tutte le professioni del mondo* (Venice, 1585), after mentioning Apicius, lists other ancient authors who engaged in the culinary matters such as Epicurus, Varro, Columella. From this vantage point he continues to list his contemporaries — Platina, Domenico Romoli called Panunto,[32] Cristoforo Messisbugo, and Scappi.[33] Thus, cookbooks appeared to have been read by humanists and possibly by their patrons.

1.2 Fish in Cookbooks: General Properties

In this part, I define the basic characteristics of fish to be served in a noble household. In the Middle Ages and early modernity, fish was considered a 'lean' food as opposed to the fat days when the consumption of meat was unrestrained. Although all the recipe collections mentioned differ from each other, they all dedicate a separate section to fish dishes, except for the anonymous Venetian manuscript. In these sections, fish dishes are usually accompanied by vegetable and fruit soups and pies — other characteristically lean dishes cooked without eggs, lard, and, obviously, meat. Whether the chapter title offers recipes for all types of fish as in the last part of Martino's book and tenth section of Messisbugo's tract, or explicitly puts fish dishes in the chapter dealing with lean and Lenten days, as in Scappi's cookbook, fish seems to be clearly distinguished from meat. In other parts of the books, fish is usually mentioned as a lean substitute for meat, as in Messisbugo's recipe for *capirota* soup where pike can replace poultry, or in yellow dish in the Neapolitan style where pike and seabass replace capon.[34] However, menus for the dinners served by Messisbugo and Scappi testify to fish being served on meat days too. For instance, at a Sunday dinner organized by Ercole II d'Este for his father Alfonso

[31] Krohn, *Food and Knowledge*, 167-174.
[32] Domenico Romoli Panunto, *La singolare dottrina* (Venice, 1560).
[33] Tomaso Garzoni, *La piazza universale di tutte le professioni del mondo* (Venice, 1593), 684.
[34] Messisbugo, *Banchetti,* 33r, 34v.

I, Archbishop of Milan, and two Venetian ambassadors on January 24, 1529, poultry, calf, goat, etc. were served together with seabass, trout, pike, eels, sturgeon, and other fishes.[35] The same applies to dinners No. 4 (date is not provided) and No. 11 (Sunday during Carnival 1524). Even when the fish dishes are not served during main courses the number of which varied from 2-4 courses in Scappi's case and up to 17 in Messisbugo, oysters usually conclude meals. Regardless of the season, every dinner Messisbugo describes in the book contains oysters in the concluding course in numbers ranging from 300 to 2000 pieces. In addition to recipes, Scappi recommends the best time to consume oysters — from December to April, but in Venice, says he, they are present on the market throughout the year. Other places to find good oysters are Corsica and the beaches of Ancona and Chioggia. "Happening to be in the port of Brondoli near Chiozza [Chioggia]," he writes, "I saw a large number of them [oysters] gathered in; they are much whiter than the Corsican ones but also much smaller."[36] The relative unpopularity of oysters in Scappi's sample menus[37] might be connected with the aphrodisiac effect ascribed to oysters by contemporary medicine making them appear unsuitable for the Pope.[38] It did not, however, stop the Venetian nobility from excessive consumption of these saltwater mollusks, so by sumptuary law of 1562, the Senate prohibited to serve this delicacy at the banquets and feasts for more than twenty guests.[39] Oysters, on the other hand, were not an exclusively noble food. The rare zooarchaeological material from the Venetian lagoon demonstrates that nuns of the Cistercian nunnery on the small island of San Giacomo in Paludo, whose number had diminished to 6 by the fifteenth century, farmed oysters and other mussels for local

[35] Messisbugo, *Banchetti,* Dinner 2 [n.p.].
[36] Scappi, *The Opera*, 344.
[37] For instance, in course of the celebratory breakfast (*collatione*) at the very end of February 1549, 408-412 or dinner given to Charles V in April 1536 during Lent: Scappi, *The Opera*, 408-412, 412-420.
[38] Baldassare Pisanelli, *Tratatto della natura de' cibi et del bere* (Venice, 1586), 110.
[39] "The Regulation of Banquets, 1562," *Venice. A Documentary History,* eds. David Chambers, Brian Pullan (Oxford: Blackwell Publishers, 1992), 178-179.

consumption.[40] To conclude, fish and seafoods were present at the noble — and not only — table not exclusively on religiously prescribed days and, in some cases, regardless of the season.

What species were usually served and why? In the beginning of his third book, Scappi provides a general hierarchy of fishes that might be summarized as follows: marine species are better than their freshwater counterparts, yet the most delicate fish is one that comes to spawn in freshwater from the sea, although it must be gutted first. The most important characteristic of fish is its freshness, except for sturgeon, the most noble fish, that first needs to slightly dry out.[41] Although, fish is a perishable good, more than anything else subject to decay, the fresh live fish might be procured for the noble household in barrels full of sea or sweet water.[42] All the cookbooks examined here agree that a cook should macerate and wash salted fish like eels from Comacchio or tuna from Sicily in fresh water before cooking to remove excess salt. According to Martino and Scappi, in the fifteenth-sixteenth centuries, fish was mostly eaten sweet and sour, heavily seasoned with sugar, raisins, and spices that did not drastically differ from those for meat dishes: cinnamon, pepper, saffron (for a yellow colour), cloves, and nutmeg. Verjuice and verjuice grapes, vinegar, orange juice and lemons were supposed to add sourness to the dish. The common way to preserve fish, a process known as *accarpionare* (to pickle in vinegar) implied usage of great amount of vinegar and saffron; after being boiled in that mixture, fish turned into jelly as it cooled down — a method of the period usually associated with Slavonian and Dalmatian delicacies.[43] One can only speculate whether the refined

[40] Sauro Gelichi *et al.*, "Identity Marks. Organization of Spaces and Characteristics of Consumption on an Island of the Venetian Lagoon between the Later Middle Ages and the Modern Age," *Constructing Post-Medieval Archaeology in Italy: A New Agenda. Proceedings of the International Conference* (Venice, 24th and 25th November 2006), 98.
[41] Scappi, *The Opera*, 275.
[42] For instance, see the illustration in Scappi's book: Scappi, *The Opera*, 638; Bartolomeo Scappi, *Opera di Bartolomeo Scappi* (Venice, 1570), 3rd plate.
[43] Slavonian dentex in jelly: Scappi, *The Opera*, 294-295. More on this matter: Maria Lucia De Nicolò, *Del mangiar pesce fresco, 'salvato', 'navigato' nel Mediterraneo. Alimentazione, mercato, pesche ancestrali (secc. XIV-XIX)* (Pesaro: Museo della Marineria, 2019), 130-131.

sweetness characteristic of sturgeon and eel meat encouraged their wide use in medieval and early modern cuisine, as neither of the Italian cooks states this explicitly.

Use of spices in fish dishes is less connected with the humoral theory, as the same set of spices is used for meat dishes as well. The possible negative qualities of fish should have been balanced in other ways. For example, Martino highlights that "more than anything any fish should be well cooked, as in its nature it is humid, and not being well cooked, is not healthy."[44] Baldassaro Pisanelli, the sixteenth century doctor from Bologna, agrees with Martino — fish's excessive humidity should be balanced by frying or, still better, grilling it.[45] Even then, cold and humid fish (except for red mullet which was considered cold and dry) is mostly hard to digest and is not recommended for convalescent, phlegmatic and melancholic people. However, there are notable exceptions such as sturgeon, corb, lamprey, gilthead bream, eel, sardines, and seabass which contain enough nutrition, enhance appetite, stimulate production of semen, and have the most delicate taste. One should be aware, nevertheless, that sardines and seabass may still affect digestion badly causing excessive defecation. Lamprey, on the other hand, "has nothing wrong with its body but the intestines".[46] When they are taken out undamaged via its anus, every other part of lamprey can be consumed, even its blood that all three cooks in question use to prepare a sauce.[47] The probable explanation for this lies in the habitus of lamprey which frequently feeds like a parasite on other fishes' blood, thus, staying relatively clean inside. For other fish, cleaning, gutting, and scaling were mandatory steps in their primary preparation. Aside from lamprey, freshwater fish like freshwater shad, tench, or pike are less nutritious and more harmful for health as they produce phlegm and aggravate digestion.[48] On the other hand, perch and pike together with umbra, scorpion fish, red mullet and seabream

[44] Maestro Martino, *Libro de arte coquinaria*, 185.
[45] Pisanelli, *Tratatto*, 94-112.
[46] Martino, *Libro de arte coquinaria,* 191-192.
[47] Messisbugo, *Banchetti,* 61v; Scappi, *The Opera,* 310-311.
[48] Pisanelli, *Tratatto,* 104-106.

appear to be suitable species for the sick according to Scappi, although he persistently recommends consulting a physician before serving it.[49] One should not, however, exaggerate the influence of contemporary medical literature. Caviar, the famous delicacy imported from as far as Tana and Caffa on the Azov and Black seacoasts, was considered a harmful and slowly digested product, but this did not affect the persistently high demand for it.[50] Although Scappi superciliously refuses to provide a recipe for fresh caviar preserved with salt in holed barrels as he believes "it is not used in courts",[51] his northern colleagues Martino and Messisbugo did not agree.[52] Apparently, their masters had acquired a taste for such crude, or raw caviar, as well as for the pike caught in the Po River.[53]

All the fish mentioned so far are distinguished by their size, another important property of a good fish. "*Pesce vecchio, et carne giovane*," is a proverb cited by Martino, explaining that cook should always prefer the largest, that is, the most mature fish, while meat is better from young animals.[54] The same principle is reflected in the recipe titles found in Martino and Messisbugo — giant seabass, giant corb, giant trout, great pike, and large eels were apparently commonly served for the Patriarch of Aquileia and the Ferrarese overlords. However, since every principle has an exception: saltwater shad from Comacchio, although it is very big, is inferior in quality to fish from the Po River.[55] Apparently, size played a lesser role than habitat — *valle* of Comacchio represented salt fish ponds whose stagnant waters were despised by Scappi.

One final important remark considers fish roe. Scappi and Pisanelli recommend consuming fish in its season (*stagione*), that is, the spawning time when female fish comes with

[49] Scappi, *The Opera,* 568, 579.
[50] Pisanelli, *Tratatto,* 95. On the high demand for the Azov and Black Sea caviar in Venice see: De Nicolò, *Del mangiar pesce,* 122-127; David Jacoby, "Caviar Trading in Byzantium," Mare et Litora. *Essay Presented to Sergei Karpov for his 60th Birthday* (Moscow: Indrik, 2009), 349-364.
[51] Scappi, *The Opera*, 287.
[52] Martino, *Libro de arte coquinaria,* 200; Messisbugo, *Banchetti*, 66v.
[53] Scappi, *The Opera*, 330.
[54] "Old fish and young meat": Martino, *Libro de arte coquinaria,* 201.
[55] Scappi, *The Opera,* 295.

roe as additional source of nutrition that might be made into a separate dish. While sturgeon roe obviously was turned into caviar, seabass or mullet roe became bottarga, salted and pressed roe 'pies' made locally or imported from Slavonia.[56] Although it has been argued that premodern fishing regulations intended to let fish spawn freely and, thus, maintained population numbers,[57] the consumption of caviar and roe attested in other sources casts a shadow on the alleged 'sustainability' of those measurements, especially when it comes to sturgeon.

1.3 Fish in Cookbooks: Species on the Table

Zooming in on the fish species that might have been consumed in Venice, the earliest source of Venetian origin I could find — a fourteenth century anonymous recipe collection written in Venetian vernacular — does not usually specify species used in the fish dishes. One exception is the recipe for a fish pie made from tench or eel.[58] The book also says that *gelatina* sauce is good for lamprey and trout, while common fish jelly is best made with tench.[59] However, with the background of this recipe compilation remaining obscure, it is impossible to define the social status of the consumers of these species. Martino's cookbook poses another issue: although he lists a lot of fish species, he does not reveal his fish providers or specific markets where fish were purchased.

Messisbugo's dishes are made from a great variety of fishes, among which the most frequently served are sturgeon and its caviar, pike, eel, trout, turbot, barbel, carp, *tarantello* and *tonina*,[60] bottarga, crayfish or shrimps with occasional gilthead bream, seabass, tench, shad, sardines, mullet, and perch. After the sample menus, the author highlights that he writes for the

[56] Scappi, *The Opera,* 354; Martino, *Libro de arte coquinaria,* 201.
[57] Richard C. Hoffmann, "Fisheries Regulations in Late Medieval Europe. Authorities, Concerns, Measure," *Conservation's Roots: Managing for Sustainability in Preindustrial Europe, 1100–1800*, eds. Abigail Dowling and Richard Keyser (Berghahn Books, 2020), 127-153; Pierre Bevilacqua, *Venezia e le acque. Una metafora planetaria* (Roma: Donzelli Editore, 1998), 59-62; De Nicolò, *Del mangiar pesce*, 1-10.
[58] Anonimo, *Libro,* 49-50.
[59] Anonimo, *Libro,* 16, 18.
[60] *Tarantello* — salted tuna belly; *tonina* — salted tuna back.

noble household staff: "I am not wasting time and attempt to describe various vegetable or bean soups or to tell how to fry a tench or a pike heart on the grill, or similar things which any commoner woman perfectly knows how to do."[61] Although Messisbugo does provide recipes for fried tench, thus, contradicting himself, this phrase gives the reader a glimpse into the common people's — not necessarily poor — diet.

In addition, there some hints on the providers or place of origin of fish served at the table. Describing the dinner given by Count Bonifacio Bevilacqua to the brothers Ercole II d'Este and Ippolito II d'Este on September 8, 1531, Messisbugo mentions that this count "did not have time to order trout, carps and other fishes from lakes". As a result, the duchess of Chartres and Ercole's wife, Renèe of France had to procure food for this meal. On another occasion, some dishes were marked as gifts (*impresa*) presented by guests: by Ippolito II d'Este, Archbishop of Milan (cooked pike dressed in white sauce in dinner No. 11) or by Ercole II d'Este (fried tourbot dressed in white sauce in dinner No. 4). Finally, the recipe titles testify for the connection of the fish with its place of origin. One of the popular toponyms is Commachio (trout in the Comacchio style in dinners No.2 and 4 and *meggie* (probably, some sort of eel) in broth in the Comacchio style). Comacchio, located on the Venetian-Ferrarese frontier, was a renowned fishing center, something also noted by Scappi as the place to procure shad, grey mullet, and the best eels (see Chapter 2).[62] The sturgeon from Stellata in Ferrara mentioned by Scappi was in high demand in Venice as well.[63] As will be shown in the next chapter, the sturgeon deliveries from Stellata were supplemented by sturgeon roe and milt from the public fisheries of Venetian Loreo.[64]

[61] Messisbugo, *Banchetti*, [n.p.].
[62] Scappi, *The Opera*, 295, 298, 333, 353.
[63] Scappi, *The Opera,* 276.
[64] Massimo Alberini, *La cucina del Po: dalla semplicità contadina al fasto delle corti in In principio era il Po. Storia, cultura, ambiente*, eds. D. Felisati (Venice, 1998), 166.

Probably, Scappi is still the best source for the noble Venetian fish diet. Having served the Venetian cardinal, Scappi shows his familiarity with the Venetian market and local names for various species which he does not hesitate to provide. For instance, in the Venetian vernacular, hermit crab is called *granchievoli*, and its shell is used for making "looking-glass ornaments".[65] Comparing fish market in Rome and Venice, the master cook highlighted the larger size of the Venetian seabass, the greater availability of goby, mackerel, fresh and salted cuttlefish procured from Slavonia, and the already mentioned oysters.[66] In addition, he reported that in adjoining Venice Chioggia, flounder is abundantly caught with a harpoon or a trident.[67] Recipe-wise, Scappi is eager to learn the cooking methods of fishermen from Venice and Chioggia:

> "At the time I was in Venice and Ravenna I understood from the fishermen of Chiozza and Venice, who make the best pottages, that along all the seashores no other way is used to cook them [turbot] than what I described above, I believe that they are more successful with them than cooks for the reason that they do them the very instant they have caught them."[68]

The recipe Scappi talks about includes boiling turbot in oil, malmsey or white wine, and verjuice mixed together with unspecified mild spices and salt. If desired by a cook, the broth might be thickened with ground almonds, prunes, dried visciola cherries and raisins. Similar ingredients, Scappi says, are used by the Venetian fishermen to cook goby, only mild spices are substituted with the "Venetian spices" in this case.[69] It is arguable if fishermen could afford spices, although "mild spices" might stand for common local herbs like basil or oregano. Two centuries earlier the Venetian anonym recommends mixture of cloves, ginger, cinnamon, and Indian bay leaves as most suitable for fish, especially for lamprey, but this "sweet", as he calls it, seasoning cannot be considered either cheap or mild.[70] However, the very fact that Scappi

[65] Scappi, *The Opera,* 343.
[66] Scappi, *The Opera*, 292, 301-302, 316.
[67] Scappi, *The Opera*, 307.
[68] Scappi, *The Opera,* 306.
[69] Scappi, *The Opera,* 301.
[70] Anonimo, *Libro*, 40.

thought it appropriate to add a fishermen's dish in his book and to serve it for noblemen demonstrates that the dietary boundaries between classes might have not been as strict as it has been argued before.[71] Thus, Papal cook characterizes the Venetian fish market testifying for some species being available regardless of the season. The following chapter will establish if it was at odds with the fishing restrictions in the Venetian lagoon.

[71] For instance, Alien Grieco argues that food hierarchy was formed according to the Renaissance order of nature in which place of a foodstuff depended on its physical proximity to the Heaven. In his recent book, Greco states that "cooks rigorously respected food hierarchies, which in turn reflected social hierarchies": Allen J. Grieco, "Food and Social Classes in Late Medieval and Renaissance Italy," *Food. A Culinary History from Antiquity to the Present* (New York: Columbia University Press, 999), 302-312; *Idem*., *Food, Social Politics and the Order of Nature in Renaissance Italy* (Florence: Villa i Tatti, 2020), 11.

Chapter 2: *Palo* and *Pescarie*: Market Regulations

This chapter addresses the distribution sector and focuses on market regulation in early modern Venice. As Paola Lanaro has remarked, the functioning of the fish market in Venice has not been yet thoroughly addressed in historiography.[72] Even though it seems that the works of James Shaw and Fabien Faugeron went unnoticed by her,[73] the price dynamics on the fish market is indeed an under-researched topic. Its investigation has been impeded by the absence of extant sources in the archives of the *Giustizia Vecchia*, which contains hardly any documents from before the sixteenth century. This chapter can by no means offer an exhaustive view of price control and general fish market regulation; it does, however, make a first attempt in this direction predominantly based on sixteenth-century sources. The analysis of the market regulations abundantly available in the State Archive of Venice seeks to discover (1) which fish species were commoditized in the late Middle Ages and what changes occurred in the early modernity, and (2) how the consumption of these species differed between various social groups of city dwellers.

2.1 Distribution: The Fishmongers' Guild

In Venice, the distribution side of the fish trade was carried out by the guild of fishmongers. A mention of the fishmongers' guild, *Compravendi di pesce*, first appears in sources from 1227 when its statute in the form of an oath was included among others in the capitulary kept in the office of the *Giustizia Vecchia*.[74] Although entitled *Capitolare de*

[72] Paola Lanaro, "Pesca, pescicoltura, pescatori e l'impatto sull'*habitat* lagunare," *Cibo e acqua a Venezia. Storie della laguna e della città. Catalogo della mostra*, ed. Donatella Calabi, Ludovica Galeazzo (Venice: Marsilio Editore, 2015), 46.
[73] James E. Shaw, "Retail, Monopoly, and Privilege: The Dissolution of the Fishmongers' Guild of Venice, 1599," *Journal of Early Modern History* 6/4 (2002), 396-427; Fabien Faugeron, *Nourrir la ville. Ravitaillement, marchés et métiers de l'alimentation à Venise dans les derniers siécles du Moyen Âge* (Rome: École Française de Rome, 2014).
[74] ASVe, GV, b. 1, r. 1, f. 135r-137v. Published: "Capitolare dei pescivendoli," *I Capitolari delle arti veneziane sottoposte alla Giustizia e poi alla Giustizia Vecchia dalle origini al MCCCXXX*, ed. Giovanni Monticolo (Rome,

piscatoribus, the document clearly contains regulations for the fish trade, issued between 1227 and 1314. The miscellaneous entries defined the basics of the fishmongers' "art", starting from the places specifically assigned to practice the fish trade[75] to the share of profit they could take from sales (10%), as well as the introduction of the supervisors of the fish market (the *Giustizieri* joined by the master of the fishmongers') and, even basic quality control.[76] One of the most important regulations established a wholesale market - where the fishermen and fish farmers brought their catch to sell it to the fishmongers - at the *palo*, literally "pole" whose former location within the city is unclear today.[77] The office of the *palo* was supervised by the *Giustizieri* who collected taxes, evaluated the product, and set price limits that the fishmongers could not exceed in retailing.[78] Although this key provision contained numerous exceptions to it,[79] it was still regularly violated by the fishmongers, and increasingly so from the second half of the sixteenth century on. This, and the fact that the fishmongers did not abide by the set price limitations led to the suspension of the guild in 1599. The suspension, however, was not of long duration.[80] As James Shaw puts it:

> "The growing problems with the food supply in the 1590s should be understood in the broader context of the clash between the private relations of an expanding

1896), 59-74: The entries I-X in the form of oath are from 1227, while the rest was added later: XI-XXXIII – in 1286; XXXIV – in 1288; XXXV-XXXVI – in 1303; XXXVII – in 1307; XXXVIII-XXXIX – in 1314.

[75] The thirteenth century saw a gradual concentration of trade in two focal points, the Rialto and San Marco, where stone building complexes were constructed to host various kinds of markets (e.g. fish market, fruit market, etc.), while retail trade in foodstuff in other urban areas such as the Campo San Pantalon were discontinued: Faugeron, *Nourrir la ville,* 521-533. The Venetian fishmongers were prohibited to buy fish for retail sale on the islands of Poveglia, San Giacomo in Palude, and Chioggia; the fishmongers and fishermen from these islands either were required to bring their catch to the *palo* or had a privilege to sell it themselves at the stall at the fish markets specifically assigned to them: "*Capitolare dei pescivendoli*," 63, 70-71.

[76] See the entries V (on rotten fish); X (on applying fresh blood to the pike to make it look fresh); XI (on selling fish covered "cum vanitura"); XVI (on mixing "good" and "ferrous" mullet): "Capitolare dei pescivendoli," 62-65.

[77] According to the fifteenth-century writer Marin Sanudo, "the public wighhouse where all the merchandise for sale has to be weighed, and the reckonings are made of customs and excise duty" was located at the end of Riva del Ferro near the Rialo Bridge: Marin Sanudo, "Praise of the City of Venice," *Venice. A Documentary History, 1450-1630*, ed. David Chambers, Brian Pullan (Oxford: Blackwell Publishers, 1992), 11.

[78] "Capitolare dei pescivendoli," No. 19, 66; ASVe, GV, b.1, r. 3, 30 March 1573, f. 18v-19r.

[79] Concessions allowing fishmongers to buy fish outside the *palo* were especially common in the period of the year between Easter and late June when, due to general suspension of fishing for lagoonal species, the supply of fish dropped significantly: see Chapter 3 of this thesis.

[80] On this episode see: James E. Shaw, "Retail, Monopoly, and Privilege," 396-427.

> commercial economy and the older principles of public regulation that went back to the model of local producers selling their wares directly to consumers."[81]

Aside from a purely (political) economic explanation, the problem can also be understood in terms of the *moral* economy.[82] In this sense, the continuous supply crisis caused by political (Ottoman-Venetian wars) and natural factors (plague and the effects of climate change extensively discussed in Chapter 3) resulted in increasing loosening of inter-communal control and solidarity among members of the fishmongers' guild who were exposed to the crisis consequences the more the poorer they became.

Although the financial state of the fishmongers was better than that of their fishing colleagues, their households still testify to a generally low income.[83] Moreover, as the entrance requirements to the guild reserved access only for men no younger than 60 years old with at least 20 years of fishing experience,[84] the fishmongers frequently had a hard time performing their duties. These problems are attested by one of the most common sources associated with the fishmongers, the supplications submitted by them to the offices of the *Giustizia Vecchia* and the *Cinque Savi sopra le mariegole* asking for assistants. In these supplications, they usually appealed to their old age and disabilities. For instance, in 1572, Antonio Bello asked to have his son Zanetto placed as an assistant as he himself was

> "old, crippled, and unable to perform the art of fishmongers due to his old age and weakness; being responsible for his numerous family and experiencing extreme poverty, he with his family would have to beg for alms being left without the help of his colleagues."[85]

[81] Ibid., 426.
[82] E. P. Tompson, "The Moral Economy of the English Crowd in the Eighteenth Century," *Past and Present* 50 (1971), 76-136.
[83] Roberto Zago, *I Nicolotti. Storia di una comunità di pescatori a Venezia nell'età moderna* (Venice: Francisci Editore, 1984),12-14.
[84] In 1433, the Senate stipulated that all food retailers should be from the body of Venetian citizens with a household in the city: BNM, *Capitolari,* 1 February 1433, f. 21v. The membership in the fishmongers' guild, moreover, was reserved for the elderly fishermen of the fishing communities of the *Nicolotti* (from the parishes of San Nicolo dei Mendicoli and Sant'Angelo) and the *Poveggioti* (from the island of Poveglia) with exceptions made from time to time for the *Muranesi* and the *Chioggitti*: Shaw, "Retail, Monopoly, and Privilege," 407.
[85] ASVe, GV, b. 1, r. 3, 15 February 1572, f. 2r.

Others, like Vicenzo Celega in 1575, stated that they could not do their job due to loss of sight (*haver perso la luce degli occhi*).[86] It was a general practice for the Venetian authorities to satisfy the fishmongers' requests, reducing, however, the assistants' participation in the "art" to selling fish at the assigned stall. The appeal to poverty could also help the petitioners acquire the privilege to sell fish throughout the city, that is, outside the official fish markets, as was the case of fishmongers Vettorello Bon, Nicolo Basso, Francesco Borgi, and others.[87]

Aside from the legal ways to acquire assistance and mitigating their poor financial conditions, the fishmongers also tried to circumvent laws by avoiding paying tax and entering into agreements with their former colleagues; fishermen, fish farmers, and owners of the fishponds.[88] According to one of the regulations, the *compravendi* frequently concealed part of their merchandise under the stall or in a boat, probably, to create the impression of an ostensible shortage, stimulate trade and have a legitimate reason to increase prices.[89]

Thus, the increasing poverty of the fishmongers' community was, in addition, increased by the plague in 1575-1577. The outbreak killed around 40% of the population in the parishes of San Nicolo dei Mendicoli and San Angelo Raffaele where the households of the fishermen and fishmongers were concentrated and might well have resulted in the disintegration of the community creating subsequent disorder in the fish trade.

2.2 Product: Commoditized Fish Species

As has been shown in Chapter 1, there was a hierarchy of fish species considered to be suitable for the noble table. The cookbooks, however, omit the fish consumed by the larger part of society which, despite the virtual absence of ichtyoarchaeological data, can be reconstructed — to a certain extent — from the administrative sources. This section, therefore, explores the

[86] ASV, GV, b. 1, r. 3, 12 October 1575, f. 65r.
[87] *Capitolare Rosa*, ASVe, GV, b. 5, r. 12, 16 July 1577, f. 15v.
[88] *Capitolare Rosa*, ASVe, GV, b. 5, r. 12, f. 24r, 26r.
[89] *Capitolare Rosa*, ASVe, GV, b. 5, r. 12, f. 24r.

commercialization of fish species in Venice starting from noble species such as sturgeon to the food for common people such as goby and eels.

2.2.1 Sturgeon

Although generally distancing themselves from the western European political world at least until the sixteenth century, the Venetian ruling class definitely shared the tastes of European elites for sturgeon and caviar. Large deliveries of this delicacy from the Azov Sea and the Don River via the Venetian colonies on the Black Sea coast and Constantinople to Venice proper are attested by the notarial documents and account books of the Venetian residents in Tana and Caffa.[90] David Jacoby cites a document according to which, in 1427, the purchase of sturgeon and caviar was concentrated in the hands of the Ternaria Nuova chiefly responsible for import-export trade.[91] From the second half of the sixteenth century, after the Republic had lost its colonies to the Ottoman Empire and the direct connection with the Black Sea ports was interrupted, the Venetians invested in deliveries of caviar from Muscovy on Flemish ships.[92] The trade in locally available Adriatic sturgeon (*Acipenser naccarii Bonaparte, 1836*), however, is significantly less studied, although the archival documents testify to the presence of commercial sturgeon fisheries in the Venetian *Stato da terra*.

Although sturgeon is an anadromous species that migrates from the sea up the estuaries and in theory can be present in the brackish waters of the Venice Lagoon, it has been established that the Adriatic sturgeon can endure high salinities in the water for only a short period of time.[93] Thus, it does not come as a surprise that the sturgeon fishing in the Venetian Republic took place in the Po and Adige estuaries rather than on the lagoon. According to the letters sent by

[90] David Jacoby, "Caviar Trading in Byzantium," 358-362; Evgeny Khvalkov, *The Colonies of Genoa in the Black Sea Region: Evolution and Transformation* (New York: Routledge, 2017), 342-345.
[91] Jacoby, "Caviar Trading in Byzantium," 353.
[92] De Nicolò, *Del Mangiar Pesce*, 122-126.
[93] D.J. McKenzie *et al*., "Some Aspects of Osmotic and Ionic Regulation in Adriatic Sturgeon *Acipenser naccarii*. II: Morpho-Physiological Adjustments to Hyperosmotic Environments," *Journal of Applied Ichthyology* 15/4-5 (1999), 61-66.

the *Giustizieri* and the *Cinque Savi sopra le mariegole* to the podesta of Loreo, this commune was the main supply center of the sturgeon to the metropolis.[94] Local fishermen had to obtain a license from the podesta to transport their catch to the Venetian *palo*, where it was bought by the fishmongers to retail it in cuts from their stalls.[95] Apparently, the fishermen's community of Loreo was strong enough to lobby for their interests in Venice. In 1556, due to their intervention, the prohibition to buy up sturgeon and sell it at auction to achieve a better price was revoked.[96] The sources, however, do not permit an assessment of the volume of sturgeon trade between Loreo and Venice.

While the executive members of the *Giustizia Vecchia* were obliged to register every delivery of sturgeon in Venice, weigh it, and assign a price for every catch, the decision-making body together with the Senate regularly set the price limits that could not be exceeded during evaluation. Within these tariffs, sturgeon appears in the same group with *morone*, semi-salted sturgeon belly, and other fish *da taglio*, that is, those sold in cuts — the leerfish (*Lichia amia*). These fragmented sources show a significant increase in prices in the second half of the sixteenth century: if between 1445 and 1556 the difference is subtle (5 *soldi* per pound and 5-6 *soldi* per pound respectively excluding the time of Lent, Advent, and Ember days), in just the next 30 years, the price had doubled for sturgeon *da ovi* (12 *soldi* per pound in 1586) and almost tripled for the sturgeon *da latte* (16 *soldi* per pound).[97] Most probably, this price hike was connected to complications in the Ottoman-Venetian relationship. One, however, should not ignore the fact that the three Ottoman-Venetian wars between 1463 and 1540, although otherwise disastrous for Venice, did not significantly affect the price of sturgeon. Further

[94] See copies of these letters: ASVe, GV, b. 1, r. 3, 11 April 1575, f. 54v; *Capitolare Rosa,* ASVe, GV, b. 5, r. 12, 12 April 1578, f. 104v.
[95] *Capitolari del Magistrato della Giustizia Vecchia: Sommario dei Capitolari Antico, Rosso, Rosa et Orsa et di Altre Parti spettanti al Mag.to Ill.mo della Giustizia Vecchia delle Raccolte P.ma, 2.da, 3.za, 4.ta.* BNM, Ms. It. VII 1572 (7642) (hereafter *Capitolari*), 14 October 1445, f. 187v.
[96] *Capitolari,* BNM, Ms. It. VII 1572 (7642), 23 January 1556, f. 189r.
[97] *Capitolari,* BNM, Ms. It. VII 1572 (7642),14 October 1445, f. 187v; 23 January 1556, f. 189r; 10 June 1586, f. 194r.

research is needed to place this price hike within the broader context of the price fluctuations on the food market in Venice.

2.2.2 Il pesce bianco e negro

"White" fish occupied second place in the consumption hierarchy of the early modern Venetians, as shown by the price limits established in 1578. It included a wide range of marine and brackish water species: common dentex (*Dentex dentex Linnaeus, 1758*), the shi drum (*Umbrina cirrosa Linnaeus, 1758*), young sturgeon (it. *porcelletta*), the brill (*Scophthalmus rhombus Linnaeus, 1758*), gilthead bream (*Sparatus aurata Linnaeus, 1758*), red and grey mullet (*Mullus barbatus Linnaeus, 1758* and *Mugil cephalus Linnaeus, 1758*), the European bass (*Dicentrarchus labrax Linnaeus, 1758*), the European scorpionfish (*Scorpaena porcus Linnaeus, 1758*), mackerel (family *Scombridae*), saupe (*Sarpa salpa Linnaeus, 1758*), rayfish (*Raja miraletus Linnaeus, 1758*), and other fish species whose local Venetian names have not yet been identified with particular species (*baicoli*, *suri*, *sarghi*, etc.).[98] All these fish are present in the Adriatic Sea; the gilthead bream and red mullet, moreover, were raised in the fish ponds constructed on the Venetian lagoon (on *valli* see Chapter 3). In 1578, the regular price limit for these species was 9 *soldi* per pound for fish less than 1 pound in weight and 12 *soldi* (14 *soldi* during Lent) per pound for fish that weighed more than 1 pound.[99] The comparison of these prices with the contemporary tariffs for sturgeon indicates that these marine species were only slightly cheaper than the king of fishes and clearly meant for noble consumption.

The less prestigious and costly "black" fishes were reserved for the less well-off Venetians. The same document from 1578, lists the following *pesce negro*: the European eel (*Anguilla Anguilla Linnaeus, 1758*), the European flounder (*Platichthys flesus Linnaeus, 1758*), the grass and rock goby (*Zosterisessor ophiocephalus Whitley, 1935, Gobius paganellus*

[98] *Capitolare Orsa VII,* ASVe, GV, b. 5, r. 13, 17 September 1578, f. 29r-31v.
[99] Ibid.

Linnaeus, 1758), the blotched picarel (*Spicara maena Linnaeus, 1758*), the European pilchard (*Sardina pilchardus Walbaum, 1792*), juvenile red mullet (Veneto: *barboncini*), cuttlefish (*Sepia officinalis Linnaeus, 1758*), crayfish, and squid. These species were to be sold at half the price of the" white" fish, both during Lenten time and throughout the year (7 *soldi* and 6 *soldi* per pound respectively). To make sure that the customers would not be cheated by the fishmongers, every morning, the scribe of the *palo* office was obliged to write down the tariffs for "white" and "black" species and attach them to the pilaster of the said office. Moreover, this same scribe had to provide every fishmonger with a copy of the tariff list to be kept on their stalls, attached to the scales.[100]

Freshwater fish, although excluded from the "black" species category, did not significantly differ from them price-wise. In October 1578, the *Cinque Savi sopra le Mariegole* established the limit of 5-6 *soldi* per pound for all freshwater species during regular times and 6-7 *soldi* — during Lent.[101] It was, apparently, the salted fish so disliked in the noble cuisine that was considered food for the city poor. Unfortunately, I was not able to discover the price limits set on salted fish. Interestingly, however, just before the beginning of Lent in 1578, the fishmongers obtained permission to sell salted — and only salted, as emphasized the *Cinque Savi* — fish outside the official fish markets (that is, on Campo San Pantalon, Ponte di Cannaregio, and Fondamenta di Castello from San Sepulcro to San Domenico, and Zattere) "for the benefit and convenience of the poor."[102] Since salted fish was a less perishable product, the retailers were allowed to buy it directly from the producers at a bargain price. They were, however, required to report all their purchases to the guild.[103] One of their main providers of salted fish were the fisheries of Comacchio in the Ferrarese territory.

[100] *Capitolare Orsa VII,* ASVe, GV, b. 5, r. 13, 21 October 1578, f. 31r.
[101] *Capitolare Orsa VII,* ASVe, GV, b. 5, r. 13, f. 53v.
[102] *Capitolare Rosa,* ASVe, GV, b. 5, r. 12, 20 February 1578, f. 91v.
[103] Shaw, "Retail, "Monopoly," and Privilege," 399.

2.3 Fish Trade between Venice and Ferrara

The economic connections between the two neighboring city-states had already been established in the twelfth century by a group of treatises regulating the privileges of the Venetian and Ferrarese merchants and establishing a commercial court for them.[104] One side of this commercial relationship was the fish trade. As shown in the first chapter, fish from Commachio was known to the renowned cooks of the sixteenth century such as Scappi and Messisbugo. The Venetian administrative sources also abound in mentions of eels from Comacchio, the deliveries of which significantly increased in the late sixteenth century.[105]

The letter of Venetian doge Francesco Foscari to Niccolò III d'Este, Marquess of Ferrara, issued on November 25, 1436, the eve of the Nativity Fast, demonstrates that Venetians were already in regular contract with fish farmers (*vallesani*) from Comacchio in the fifteenth century. However, that year, the farmers were only able to provide their Venetians clients with a minor part of what had been promised. The letter reports that the Venetian citizens, deprived of the promised goods, approached the Marquess of Ferrara asking him to put pressure on his subjects to give them the full amount of fish they had paid for, but this did not lead to a positive resolution of the problem. On the contrary, the marquess brought counterclaims against them, which, according to the writer of the letter, were "positively inconsistent with any justice and honor" (*que profecto ab omni equitate et honestate dissentiunt*). The Venetian side insisted that, although it was true that the usual volume of fish was delivered to the Venetian buyers, the Comacchio inhabitants were still obliged to deliver a greater quantity based on the terms of the contract, even if they did not normally produce such a catch during the year. Apparently, the people of Comacchio were under the direct jurisdiction of the Marquess d'Este or they might

[104] Faugeron, *Nourrir la ville*, 335-336.
[105] After the suspension of the *Cinque Savi sopra le mariegole* in 1579, their registry book was adapted for registering privileges of and contracts with the fish suppliers from Comacchio for the rest of the sixteenth century and first half of the seventeenth century: *Capitolare Rosa,* ASVe, GV, b. 5, r. 12, f. 119r (to the end of the book).

have rented a plot of Marquess' private lands to conduct their farming business, paying for it in goods, that is, in fish. Anyway, without Niccolò's order, they could not sell additional quantities of fish — a rule they had broken by contracting with the Venetians for larger than usual supplies. The Doge's message was intended to convince Niccolò III d'Este that the Venetian citizens should receive what they had been promised in full, regardless of the actual size of the catch, of which the Comacchio inhabitants were to send a set portion to Ferrara. Unfortunately, the outcome of this case is unknown, as well as the fish species that were being traded. On the other hand, it testifies to the competition over aquatic sources that existed between these two close polities that became especially acute in years of scarcity.

The sixteenth-century sources repeatedly confirm an "old and solid right" of the *Comacchiesi* to sell 2/3 of their catch at the *palo* and 1/3 freely in the official fish markets of Venice during Advent.[106] However, in the 1570s, the fishermen of Comacchio regularly failed to satisfy the Venetian demand for eels, traditional festive food,[107] so the fishmongers were allowed to sell the scarce product at Lenten prices (6 *soldi* per pound).[108] The shortage of fish was felt in the Venetian *Stato da terra* as well. Responding to the requests of the communes of Padua, Vicenza, and Verona, the Venetian authorities granted them extraordinary concessions for fish extraction from the communal fisheries in Loreo, Cavarzere, and Adria.[109] The Ferraresi, in their turn, also obtained grants on the fish ponds of the said communes. Thus, according to their contracts with the Venetian authorities, Marc Antonio Landrino and Giulio Landrino set out to buy fish for the Ferrarese court in the fisheries of Comacchio, Loreo, Cavarzere and Adria but were free to dispose of only 1/4 and 1/3 parts of their catch

[106] *Capitolare Orsa VII*, ASVe, GV, b. 5, r. 13, 19 June 1578, f. 20r-20v; ASVe, GV, b. 1, r. 3, f. 118r.
[107] Shaw, "Retail, "Monopoly," and Privilege," 401.
[108] *Capitolare Orsa VII*, ASVe, GV, b. 5, r. 13, 11 December 1578, f. 68v.
[109] *Capitolare Orsa VII*, ASVe, GV, b. 5, r. 13, 18 February 1579, f. 74r; *Capitolare Rosa*, ASVe, GV, b. 5, r. 12, 24 January 1578, f. 87v, 5 Febriary 1578, f. 89r, 22 March 1578, f. 94v.

respectively, while the rest had to be sent to Venice.[110] The two men, however, regularly withheld deliveries which caused growing irritation in Venice already suffering from the fish dearth.[111] In dealing with this *carestia*, the *Cinque Savi sopra le Mariegole* insisted that the lagoonal and mainland fishermen's communities to send as much fish as possible to Venice, although they struggled to supply enough product for all customers.[112] As later sources demonstrate, this period of scarcity was not just an episodic event, but rather a worrying sign of progressing fish stock depletion and climatic volatility.

2.4 *Carestia* — An Issue of Distribution or Supply?

In June 1579, extensively — and furiously — replying to the request of merchant Zuanne de Bona to reduce food taxes, the *Cinque Savi sopra le Mariegole* exposed a dramatic reduction in the tax collected in St Mark's city.[113] According to them, in the last year,[114] no more than 1700 *ducati* entered into treasury from the whole fish market, while earlier they had been accustomed to collect a maximum of 500 *ducati* from eel deliveries in the first four months of the year alone.[115] "In such a poor year as this," they complained, "when there are no eels, no freshwater fish, and the amount of sea fish does not reach the usual", the city cannot afford to reduce taxes because they risk being left without any profits at all.

[110] On the conditions of Giulio Landrino's contract: Capitolare Rosa, ASVe, GV, b. 5, r. 12, 15 October 1577, f. 58r-58v; *Capitolare Orsa VII*, ASVe, GV, b. 5, r. 13, 5 November 1578 57r-57v. On the conditions of Marc Antonio Landrino's contract see: *Capitolare Orsa VII*, ASVe, GV, b. 5, r. 13, 4 November 1578, f. 56r-57r. On the confusion of contracts of these two namesakes: *Capitolare Orsa VII*, ASVe, GV, b. 5, r. 13, 20 November 1578, f. 66v.

[111] The numerous letters of the *Cinque Savi sopra le mariegole* to the podesta of Cavarzere, Loreo, and Adria, order local governors to, more or less, openly investigate the catch volumes of these two Landrino and reprimand them for postponing fish deliveries to Venice: *Letter to the podesta of Adria, Capitolare Orsa VII*, ASVe, GV, b. 5, r. 13, 11 December 1578, f. 68v; *Letter to the podesta of Cavarzere, Capitolare Orsa VII*, ASVe, GV, b. 5, r. 13, 11 December 1578, f. 69r; *Letter to the podesta of Adria, Capitolare Orsa VII*, ASVe, GV, b. 5, r. 13, 28 December 1579, f. 81r;

[112] The letters if the *Cinque savi* to the local governors persistently demand from local governors to send fish to Venice. In some cases, the Venetian authorities make concessions and allow the mainland fishermen to freely sell their catch at any price skipping the evaluation by the *Giustizieri*: *Letter to the podesta of Adria,* ASVe, GV, *Rosa,* 22 September 1577, f. 53v-54r; *Letter to the podesta of Chioggia*, ASVe, GV, *Rosa,* 20 January 1578, f. 85v; *Letter to the podesta of Adria,* ASVe, GV, *Rosa,* 24 January 1578, f. 88r-88v.

[113] *Capitolare Orsa VII*, ASVe, GV, b. 5, r. 13, f. 76r-77v.

[114] In Venice, year started in March.

[115] That is, from March to June when the document was written.

The dearth of fish on the fish market was already attested several years earlier, in 1575. At that time, however, the authorities saw its causes in overpricing on the part of the fishmongers who bought fish from outside the *palo*, directly from fishermen's boats, and resold it at very high prices.[116] As the studies of the Great Famine demonstrate, the Latin word *caristia* (it. *carestia*) had a broad semantic spectrum in the late Middle Ages and, according to William Jordan, "usually signifying high prices, it did not necessarily imply famine conditions or even widespread declines in consumption."[117] In the case of Venice, Fabien Faugeron uses this understanding of *carestia* as a period of high prices rather than a shortage of certain goods that was generally uncommon in Italy.[118] Starting from 1577, on the other hand, sources clearly reveal a persistent *supply* issue on the fish market which contemporaries connected with the dominance of "high waters" in the fish ponds and on the lagoon.[119] The increasing dependence of Venice on fish exports from Comacchio, Istria and, in the seventeenth century, from the Atlantic fisheries[120] shows that, despite persistent attempt to restrict juvenile fishing and use of fishing equipment harmful to the fish stock, sustainable management in pre-modern Venice eventually failed to secure the local fish supply in the face of the changing social and natural environments.

[116] ASVe, GV, b. 1, r. 3, 20 September 1575, f. 60v-61v.
[117] William Chester Jordan, *The Great Famine. Northern Europe in the Early Fourteenth Century* (Princeton: Princeton University Press, 1996), 11.
[118] Faugeron, *Nourrir la ville*, 187-189.
[119] *Capitolare Orsa VII*, ASVe, GV, b. 5, r. 13, 68r, 77r.
[120] De Nicolò, *Del Mangiar Pesce*, 8, 104.

Chapter 3: "For the abundance of the city and the great benefit of its fishermen": Regulations of Fisheries in Venice

This chapter deals with a body of fishing regulations that nowadays would be considered environmental in nature, although the concept of environment comes from a significantly later time. It does not, however, mean that in the late Middle Ages and early modern period, there was no understanding of the interconnection between anthropogenic activities and alterations that occurred in nature. The level of this understanding qualitatively differed from the scientific ideas of modern time and stemmed primarily from everyday experience with a certain environment, information that was frequently acquired and transmitted on an intergenerational level and connected to close observation of natural processes. These observations, rather than contemporary philosophical ideas, underlay the regulation of fishing in the Venetian Republic in the fourteenth-sixteenth centuries — in the words of Gherardo Ortalli, "the emphasis was very much on pragmatism".[121] In the following section, I explore the institutional framework in which these regulations were made, the reasons behind them, and their possible effect on the lagoonal environment.

3.1 Environmental settings

Since this chapter is primarily concerned with the management of natural resources in the Venice Lagoon, the contextualization of the primary sources demands a general introduction to the state of the lagoonal environment in the fifteenth-sixteenth centuries, which significantly differed from what one can see today. While nowadays the subsidence of soils and the general rise of sea level caused by Global Warming threaten the survival of the city, the early modern

[121] Gherardo Ortalli, "Forms of Knowledge in the Conservation of Natural Resources: From the Middle Ages to the Venetian "Tribe," *Nature Knowledge: Ethnoscience, Cognition, and Utility,* ed. Glauco Sanga and Gherardo Ortalli (New York: Berghahn Books, 2003), 396.

period is characterized by the opposite problem, that is, alluviation. The accumulation of silt brought by the Brenta River in the south and the Piave in the north of the lagoon naturally transformed the geomorphology of the lagoon into a deltaic one characterized by the desalination of already brackish waters, significant changes in the aquaculture, and proliferation of marshlands, which would have consequently resulted in the malaria outbreak and blockage of the Venetian ports. The Venetians very early realized the interconnection between this alluvial discharge resulting in increasing shallowness of the lagoon with possible consequences for the city. However, it was the second half of the fifteenth century when their concerns began to grow more pronounced. According to Elizabeth Crouzet-Pavan, if earlier the Venetian commune concentrated its effort on the reclamation of land and maintenance of the channels, in the fifteenth century the focus of attention shifted toward the progressing alluviation, which already was showing in the paludification and gradual abandonment of the town of Torcello.[122] Even deciding on matters not necessarily connected to the management of the aquatic resources, as in the case of timber supply, the Venetian officials tended to be very sensitive to any signs of silting and shallowing in both the lagoon and the areas of Terraferma directly adjacent to it.[123] The outcome of this shift became the hydraulic projects of the sixteenth century aimed at diverting the bed of the Brenta River from flowing into the Venice Lagoon to discharge directly into the Adriatic Sea. As present-day geomorphological studies demonstrate, this long-lasting enterprise indeed averted the alluviation of the lagoon in its southern and central parts, where the deltaic alluvial channels went eventually buried under lagoonal shallows.[124] During the following centuries, the changed balance between salt and freshwaters facilitated the

[122] Élisabeth Crouzet-Pavan, *Le Moyen Âge de Venise,* 234-235.
[123] Karl Appuhn, *A Forest on the Sea: Environmental Expertise in Renaissance Venice* (Baltimore: The Johns Hopkins University Press, 2009), 64-65.
[124] Luigi Tosi *et al*., "Morphological Framework of the Venice Lagoon (Italy) by Very Shallow Water VHRS Surveys: Evidence of Radical Changes Triggered by Human-Induced River Diversions," *Geophysical Research Letters* 9/36 (2009), https://agupubs.onlinelibrary.wiley.com/doi/full/10.1029/2008GL037136.

proliferation of salt marshes, "a result of sedimentation and accretion from tidally supplied sediments and fluvial contributions".[125]

In terms of aquaculture, the diversion of the Brenta must have changed one of the major factors determining the composition of the fish living in the lagoon, the salinity of the lagoonal waters. Nowadays, fluvial discharge and marine water intrusion play the defining role in the salinity of the lagoon, while rainfall and evaporation mostly cancel each other out.[126] It is important to keep in mind that given the climatic conditions of the Little Ice Age discussed below, the role of rainfall as a freshwater source for the lagoon may have been greater in the sixteenth century. Although it is hard to calculate the historical level of salinity, the impact of the saltwater influx dominating over the fluvial discharge after the diversion of the Brenta can still be seen in the expansion of salt marsh vegetation replacing reedbeds.[127] The change of habitat would necessarily lead to alterations in the composition of fish species present in the lagoon. At the very least, one can assume that freshwater species that are not resident of the lagoon but were rather brought into it with the river flow and occupied reedbeds, steadily disappeared. On the other hand, the sand smelt (*Atherina boyeri Risso, 1810*) and the grass goby (*Zosterisessor ophiocephalus Whitley, 1935*), the two most common residents of the present-day Venice Lagoon, prosper in the seagrass.[128] In the sixteenth—seventeenth centuries, these species definitely fell into the category of non-elite products, which also could be used as bait for catching their natural predators (e.g. toad goby (*Mesogobius batrachocephalus Pallas, 1814*). Other commoditized fish species most frequently mentioned in the sources – grey and red mullet (*Mugilidae* and *Mullidae* families), gilthead sea bream (*Sparus aurata*), and

[125] Lorenzo Bonometto, "Functional Characteristics of Salt Marshes (*barene*) in the Venice Lagoon and Environmental Restoration Scenarios," *Flooding and Environmental Challenges for Venice and its Lagoon: State of Knowledge*, ed. C. A. Fletcher and T. Spencer (New York: Cambridge University Press, 2005), 476.
[126] Albert Zirino *et al*., "Salinity and Its Variability in the Lagoon of Venice, 2000–2009," *Advances in Oceanography and Limnology* 5/1 (2014), 51. Unfortunately, there is no study of the historical fluctuations in the precipitation level of the region under study.
[127] Bonometto, "Functional Characteristics of Salt Marshes", 480.
[128] Piero Franzoni *et al.*, "Fish Assemblage Diversity and Dynamics in the Venice lagoon," *Rendiconti Lincei* 21 (2010), 277.

European eel (*Anguilla anguilla*), it is unlikely that rising salinity would have significantly affected them — or at least not in a damaging way — as these species are highly adaptive to the unstable salinities of estuaries and lagoons which they mostly use as a nursery habitat.[129]

The fact that these migratory species come to the lagoon as juveniles in search of nursery areas in the mudflats[130] increases the importance of thermal conditions, since juveniles are generally more exposed to temperature change and lack the ability of adult fish to adapt to the low temperatures by going toward the open sea. While adult gilthead sea bream and grey mullet normally live in an environment where water temperature ranges from 10˚C to 25˚C, the optimal parameters for normal embryonic development and juvenile growth are between 20-30˚C for flathead grey mullet (*Mugil cephalus*) and 16-22˚C for gilthead sea bream.[131] During the fifteenth-sixteenth centuries, however, the climatic volatility caused by the Little Ice Age brought along palpable temperature fluctuations with cooler trends, especially during winter and spring,[132] the peak time of internal migration of the lagoonal juvenile migrants.[133] Additionally, the increased rainfall and sea surges obstructed fishing on the lagoon, as well as caused damage to fixed fishing equipment such as *grisiole,* reed hurdles that formed the borders of fishponds. In the *supplica* submitted to the office of the *Giustizia Vecchia* in 1584, the fish farmers list breaches in the reed hurdles caused by the floodwaters as one of the perils of their

[129] For instance, the *Mugilidae*'s salinity tolerance ranges from fresh water to high salt concentrations up to 105 PSU: Frank Nordlie, "Adaptation to Salinity and Osmoregulation in *Mugilidae*," *Biology, Ecology, and Culture of Grey Mullet (Mugilidae)*, ed. Donatella Crosetti, Stephen Blaber (Boca Raton: CRC Press, 2016), 307. For *Mugil cephalus,* the most common species of *Mullidae* in the Venice Lagoon, see: William Walsh, Christina Swanson, Cheng-Sheng Lee, "Combined Effects of Temperature and Salinity on Embryonic Development and Hatching of Striped Mullet, *Mugil cephalus,*" *Aquaculture* 97/2-3 (1991), 281-289. For the *Anguillid* see: Giulia Lionetto, Elena Giordano, Trifone Schettino, "Adaptation to Varying Salinity," *Biology and Ecology of Anguillid Eels* (Boca Raton: CRC Press, 2016), 192-206. For the *Sparus aurata*: Charlotte Bodinier *et al*., "Ontogeny of Osmoregulation and Salinity Tolerance in the Gilthead Sea Bream *Sparus aurata,*" *Comparative Biochemistry and Physiology* 157/Part A (2010), 220-228.

[130] Franzoni, "Fish Assemblage Diversity," 271-272.

[131] Emmanuil Koutrakis, "Biology and Ecology of Fry and Juveniles of *Mugilidae*," *Biology, Ecology, and Culture of Grey Mullet (Mugilidae)*, eds. Donatella Crosetti, Stephen Blaber (Boca Raton: CRC Press, 2016), 285; A. Polo, M. Yufera, E. Pascual, "Effects of temperature on egg and larval development of Sparatus aurata L.," Aquaculture 92 (1991), 367-375.

[132] Dario Camuffo *et al*., "The Little Ice Age in Italy from Documentary Proxies and Early Instrumental Records," *Méditerranée. Revue géographique des pays méditerranéens* 122 (2014), 24-27.

[133] Franzoni, "Fish assemblage diversity," 276.

craft, along with the damaged caused by frost to fish stocks.[134] Although it is not possible to estimate whether these obstacles occurred more frequently during the fifteenth-sixteenth centuries in comparison with earlier periods, one cannot ignore these complaints which come along with the notion of *carestia*, hunger, being reinforced in the administrative documents of the sixteenth century. Although the latter might be just a topos used to justify increasing control of the authorities over fish extraction and trade, given the contemporary climatic extremes and human-induced alterations in the natural landscape of the lagoon, the proclaimed dearth of fish might actually have feasible reasons behind it. It was this precarious environment that the Venetian authorities sought to control and, as they understood it, conserve.

3.2 Institutional framework

Given the fact that fishing is primarily a craft, one of the oldest in Venice, its regulation fell into the hands of institutions responsible for guild and trade management. Scarce historiography on this topic usually concentrates on the activity of the *Giustizia Vecchia* (Old Justice) in supervision over the fishmongers' guild (*Compravendi di pesce*) and the fishermen communities of the Nicolotti and, less frequently, the Poveggiotti.[135] Established by the end of the twelfth century, *Giustizia Vecchia* was indeed the main magistracy in charge of the city's craft regulations, but by no means the only one. The principal governing bodies, the Great Council, the Senate, and the Council of Ten regularly intervened in the business of the Judges (*Giustizieri*). Over the course of the sixteenth century, the authority of the Judges was reduced, while senatorial control over their activity intensified. Moreover, the establishment of the *Cinque Savi sopra le Mariegole* (Five Supervisors of the Statutes) as an extraordinary magistracy in times of crisis (first in 1519 after the War of Cambrai, later after the plague of

[134] GV, B. 91, 27 August 1584.
[135] Named after the areas in which they resided: parish of San Nicolò dei Mendicoli (also the parish of Angelo Raffaele) and the island of Poveglia respectively.

1575-1577) with its accordingly extraordinary authority that could only be opposed by the Council of Ten, led to the revision of guilds' statutes and privileges. According to James Shaw, despite the official purpose of this body being that of handling crisis' outcomes, "rather, the aim was to impose a new model of market justice, one based on principles of efficiency and authority".[136] This caused a series of conflicts between the newly established temporary institute and the guilds and the judges, including in fishing matters.

When the *Cinque Savi* initiated the revision of the fishmongers' guild's statute in 1577, their first step was to abolish the privileges previously granted to the fishmonger by the *Giustizieri*. Namely, they terminated the fishmongers' right to buy fish outside the *palo*[137] up to a maximum of 1 ducat a day for seven months starting from the first of April.[138] This concession extended by the *Giustizieri* in 1572 from a previous one issued on 29 April 1566 which allowed fishermen to procure fish from outside the *palo* only during July was revised before by the Heads of the Old Justice who found it to be in conflict with the statutes and regulations approved by the Ten. Despite this earlier suspension, this privilege was still observed by the Executors of Old Justice in 1577. In this case, the *Cinque Savi* strove to bring privileges and concessions in line with the legislation of the Council of Ten, the supreme authority of the time. Although the economic reasoning behind these changes in the regulations is not directly stated in the document, the general idea behind the restrictions of fishmongers' activity was to reduce the number of fish resellers, and thus, to keep prices low — something not possible to enforce outside the *palo*. On the other hand, given the restrictions on fishing on the lagoon and export of fish to the continent which were in force from Easter to the end of September (see below), the fish supply to the *palo* must have shrunk in spring and summer

[136] James Shaw, *The Justice of Venice: Authorities and Liberties in the Urban Economy, 1550-1700* (Oxford: Oxford University Press/British Academy, 2006), 31.
[137] Areas adjacent to the markets of San Marco and Rialto where taxes were paid and fish was bought wholesale by the fishmongers.
[138] *Capitolare Rosa*, ASV, b. 5, r. 12, f. 3r-3v.

months, thus, worsening the issue of providing the city with fish and the fishmongers with profit. This clash between two social agendas — price control and providing for the city — was hard to resolve, and the lack of collaboration between various Venetian authorities did not help the situation.

To complicate it even further, in 1501, an executive body of the *Savi alle acque* (supervisors of water resources) was established to prevent the lagoon from "turning into *terraferma,*"[139] referring to the alluviation issue discussed above. Four years later, it was joined by the decision-making *Collegio delle acque* (collegium of water resources) with high-ranking officials, including the doge, forming the core of this magistracy. In the decision-making process, they relied on the advice of fishermen from both Venice proper and the lagoonal islands (Murano, Burano, etc.),[140] and, as I will show later, on the expertise of local officials. While the *Giustizia Vecchia* and *Savi sopra le mariegola* were primarily responsible for the supervision of crafts, the range of duties of the newly established office varied from the canal maintenance to control over "fish farmers'" activities in the *valle,* the latter being of particular interest for this dissertation (see section 3.5 in this chapter).

Not only was the unsteady natural environment of the Venice Lagoon barely controllable, but the coexisting magistracies with overlapping jurisdictions also pursued different socio-economic ends — all ostensibly for the benefit of the urban community — but lacking a common course of action. It is not a surprise then that the "environmental" regulations addressed below were issued and revised repeatedly by different governing bodies and came with a bunch of exemptions. Moreover, as I will show in the following section, the Venetian authorities had to navigate between different, sometimes discrepant, expert opinions which were not free of gain-driven self-interest.

[139] Girolamo Priuli, *I Diarii*, *1494-1512,* cited in: Christian Matheiu, *Inselstadt Venedig. Umweltgeschichte eines Mythos in der Frühen Neuzeit* (Köln: Böhlau Verlag, 2007), 68.
[140] Matheiu, *Inselstadt Venedig,* 68.

3.3 Regulation of fishing seasons

The regulations of fishing fall into two main categories, the seasonal suspension of fishing for certain species and the regulation of types of fishing nets, their mesh size, and seasonal use. Rather vague and general at first, during the fifteenth century, both categories of regulation gradually merged and developed into complex provisions which defined when, where, how, and for what species fishing was prohibited, thus, showing the growing awareness of the Venetian authorities of fish reproductive cycles and impacts of fishing on the environment. The *extant* sources testify to the intensification of fishing legislation in the last quarter of the sixteenth century which continued well into the seventeenth century (see Fig. 1).

Seasonal fishing suspensions known from the thirteenth century are repetitive in character and lack implicit reasoning. Most are only available in highly abbreviated copies. The first regulation of this sort comes from the Statute of Fishmongers (1227), according to the very first entry of which, the fishmongers were forbidden to buy fish in order to resell it *in terra* from Easter to the feast of St Michael (September 29).[141] Although this regulation touches upon fish trade rather than fishing *per se*, the yearly period of restricted export of fish from the lagoon generally coincides with the later seasonal suspensions of lagoonal fishing.

At first glance, this restriction does not seem reasonable, as post-Easter spring and summer months with no major fasts like Lent or Advent should have meant reduction in demand for fish in the city. One must consider, though, that this period also falls during the warmest time of the year in the Mediterranean, making preservation of this highly perishable product and its transport to the continental markets harder.[142] It seems, however, natural factors played a decisive role in this case.

[141] "Capitolare dei pescivendoli," No. 1, 59-60.

[142] Due to technological constraints of the preindustrial society, fresh marine fish could not be transported farther than 30-50 km from the coast, while the main consumer markets of Padua, Vicenza and Verona are 40 km, 62 km, and 105 km distant from Venice. The maximum distance of 150 km given by Hoffmann applies mostly to the transportation of the marine species highly estimated by the inland elites, and was hard to achieve even in cooler

Due to its complex environment with great variations in salinity, vegetation, saturation, and depth, the Venice Lagoon is rather poor in resident species represented by several species of goby (*Gobiidae*), pipefishes (*Syngnathidae*), and pupfishes (*Cyprinodontidae*).[143] The diversity of the ecosystem, thus, is ensured mostly by juvenile and seasonal migrants, including historically commercial species — gilthead seabream (*Sparus aurata*), European flounder (*Platichthys flesus*), seabass (*Dicentrarchus labrax*), several species of grey mullets (fam. *Mugilidae*), and the striped red mullet (*Mullus surmuletus*). The present-day migration patterns show that the peak of juvenile internal recruitment was in early spring, which means that during Lent and just after Easter, the natural mudflats (*barene*) and fishponds (*valle*) are — and were — populated by fish fry.[144] Indeed, the suspension of fishing followed this temporal pattern and encompassed target species represented mostly by juvenile migrants such as grey mullet, gilthead sea bream, and European flounder with one exception for the grass goby, lagoonal residents whose spawning period, nevertheless, starts roughly at the same time.[145]

One of the earliest examples of the seasonal regulations (8 March 1314) bans mullet fishing until the feast of St Peter (June 29).[146] Just two weeks later, the Great Council repeated the ban without specifying the fish species, making it unclear whether a general suspension of the fishing on the lagoon was implied.[147] Significantly later, on May 25, 1400, the Collegium re-affirmed the old ban on mullet fishing, extending it to the gilthead bream.[148] As this provision does not specify the time limits of the suspension, I assume it was meant to enforce the then-current suspension period in the middle of which this regulation was issued, similarly to the

climates: Richard Hoffmann, "Frontier Foods for Later Medieval Consumers: Culture, Economy, Ecology," *Environment and History* 7/2 (2001), 140-143; Idem., "A Brief History of Aquatic Resource Use in Medieval Europe," *Helgoland Marine Research* 59 (2005), 26-28; Poul Holm et al., "The North Atlantic Fish Revolution (ca. AD 1500)," *Quaternary Research* (July 2019), 1-2.

[143] Franzoni, "Fish assemblage diversity," 270.

[144] Franzoni, "Fish assemblage diversity," 270.

[145] According to Roberto Zago, constant presence of grass goby in the lagoon throughout the year made it widely available for and popular among the *popolani*: Roberto Zago, *I Nicolotti*, 168.

[146] *La pesca nella Laguna di Venezia*, 21.

[147] *La pesca nella Laguna di Venezia*, 21.

[148] *Capitolari*, BNM, ms. It. VII 1572 (7642), f. 185v.

provisions made by the *Giustizieri* on 15 May 1415.[149] By the end of the fifteenth century, the list of "protected" species had been supplemented by flounder and grass goby "*da ovi*", that is, "full of roe" during their spawning period.[150] Apparently, these measures proved to be insufficient for the preservation of the fish stock, which provoked extension of the suspension period until the feast of Saint Jacob (July 25) and the feast of Saint Michael (September 29), although these extensions did not follow any one discernible pattern and were probably dependant on irregular variations in fish capture.[151]

In light of the aforementioned fishing bans, the export restriction of 1227 makes perfect sense. Since four main target species were present in the lagoon during either the juvenile (gilthead bream, mullet, flounder) or spawning stage from early spring until mid-summer or even early autumn, the supply of the Venetian fish market must have been the lowest at this time of the year. Thus, by restraining the outflow of fish to the continent, the Venetian authorities sought to secure predictable supplies for the city.

Albeit less rigorously, the Venetian authorities also sought to set limits for juvenile fishing of freshwater species, procured for Venice by both continental and local fishermen. In 1427, the Collegium specified that freshwater fish could not be sold, unless the size of the fish exceeded that of a palm.[152] A century and a half later, the decree issued by the *Cinque savi sopra le mariegola* (1577) prohibits catching tench, carp, and barbel which weigh less than 3 "ounces".[153] According to the *Savi*, the Venetian fish market had already been infested for some

[149] *La pesca nella Laguna di Venezia*, 21.
[150] The ban issued on 7 May 1492 by the Senate: *Capitolari*, BNM, ms. It. VII 1572 (7642), f. 188r.
[151] In comparison with the seasonal restrictions of the use of certain types of nets (discussed below), the suspension periods of fishing for certain species were inconsistent. For instance, in 1503, grass goby and juvenile fishing was banned from the mid-February until the September 29, while in the 1580s, this ban, extended for gilthead bream, lasted until the July 25. At the very end of the sixteenth century, fishermen were allowed to resume catching goby after the June 24, however, the gilthead fishing was restricted until September 29: *Capitolari*, BNM, Ms. It. VII 1572 (7642), f. 188r, 194v-196r.
[152] *Capitolari*, BNM, Ms. It. VII 1572 (7642), f. 185v.
[153] *Capitolare Rosa,* ASVe, GV, b. 5, r. 12, f. 54r-54v. The decree does not specify whether it should be 3 ounces *alla sottile* or *alla grossa*, however, according to Ugo Tucci, measurements *alla sotile* were used in fourteenth-century Venice for the merchandise which came from the Levant (Ugo Tucci, "La metrologia storica – qualche premessa metodologica," *Papers and Proceedings of the Department of Historical Research of the Institute of*

time with juvenile freshwater fish due to the unrestrained appetites (*li sfrenatti apetiti*) of the fishermen from Adria, Loreo, Cavarzzere, and Padua. The magistracy accused these mainland fishermen of overfishing by using nets with very small mesh. Interestingly, the document also brings up the issue of bycatch: "they catch all sorts of fish when they are still small, pull it ashore, pick out what they want and leave the rest behind, so shortly after that it dies."[154] Thus, while striving to stimulate the import of freshwater fish to Venice in their other provisions, the *Savi* extended their concerns about overfishing into the *Stato da terra*, demonstrating an unusual interest in and acute awareness of the situation. For other regular Venetian magistracies, however, freshwater fish was of lesser concern. After all, as shown in the previous chapter, most of the time these species were not even subject to examination and estimation by the *Giustizieri* at the *palo*, leaving the size and quality of fish unsupervised.[155]

The focus was on the target species present in the lagoon, and the Venetian fish market had to abide by seasonal restrictions on fishing enforced by the Venetian authorities in order to guarantee continuous supply for the city over the long run. However, it was not only important *what* was caught, but also *how*. As the next section demonstrates, the Venetian authorities put even more attention into the regulation of fishing equipment, whose effects, it was believed, could not only impoverish the fish stock but also contribute to a major environmental issue of the City of St Mark, sedimentation.

3.4 Regulation of fishing equipment

The regulations concerning fishing equipment are mostly concerned with various types of fishing nets traditionally employed by the local fishermen until the nineteenth century and

Historical and Social Research of Croatian Academy of Sciences and Arts 7 (1974), 310-311). For local fish, then, the weight should be estimated in ounces *alla grossa*: 3 ounces ≈ 0.119 kg.

[154] *Capitolare Rosa,* ASVe, GV, b. 5, r. 12, f. 54v.

[155] It does not mean, however, that freshwater fishing was not overseen by the local mainland authorities.

even nowadays.[156] The Venetian authorities were concerned with the use of *trata*, a trawl net weighted with lead, up to 30 m in length,[157] and *grisiole*, reed hurdles used in the fishponds (about them, see next section in this chapter). The first ban on their use was issued by the Great Council in 1314 and was intended to last until the end of June.[158] In the first half of the fifteenth century, these bans were extended to include *seraglia*, a surrounding seine net, and *cogoli*, a cylindric seine net with wings, predominantly used in the canals for goby fishing.[159] From the early sixteenth century, the regulations took aim at control of the use of *braganga*, lead-weighted trawl nets, dragged behind boats of the same name,[160] and *ostregher*, a smaller trawl net.[161] At the very end of the sixteenth century, the nets specifically made for flounder and eel fishing appeared among the restricted equipment as well.[162] Among other fishing methods which caused concern to the Venetian authorities were *fossina*, a multi-toothed fishing harpoon used for grass goby fishing, and fishing of goby *a brazzo* (lit. "on arm").[163] The latter catching technique was known in north-western Europe and frequently implied the preparation and use of piscicides, although such details are missing for the Venice Lagoon.[164] This method yielded a palpable harvest only when applied in high concentrations of fish in stagnant waters, often encountered in the lagoon but which could cause damage to the stock.[165] The Venetian

[156] However, one must be aware that although traditional fishing techniques might have been preserved throughout centuries, changes in the materials available for making fishing nets, and development of water transport have the power to significantly alter historical methods of fishing and production of fishing equipment.
[157] *La pesca nella Laguna di Venezia,* 167.
[158] Assumingly, starting from Easter: *La pesca nella Laguna di Venezia,* 21.
[159] *La pesca nella Laguna di Venezia,* 46-48. First known ban on *seraglia* in 1400: *Capitolari*, BNM, ms. It. VII 1572 (7642), f. 186v. *Cogoli* – in 1492, however, a much earlier regulation of 1365 prohibits the use of *cogoli* around the island of Poveglia making an exclusion only for the *Poveggiotti*: *La pesca nella Laguna di Venezia,* 21; *Capitolari*, BNM, ms. It. VII 1572 (7642), f. 188r.
[160] *Capitolari*, BNM, ms. It. VII 1572 (7642), f. 186v.
[161] *Capitolari*, BNM, ms. It. VII 1572 (7642), f. 195r.
[162] *Capitolari*, BNM, ms. It. VII 1572 (7642), f. 195v-196v.
[163] *Capitolari,* BNM*,* ms. It. VII 1572 (7642), f. 188r.
[164] For instance, see: "How to Catch Fish (Wie man fisch und vögel fahen soll)," ed. and transl. Richard C. Hoffmann in Richard C. Hoffmann, *Fisher's Craft and Lettered Art. Tracts on Fishing from the end of the Middle Ages* (Toronto: University of Toronto Press, 1997), 83.
[165] Richard C. Hoffmann, *Fisher's Craft and Lettered Art,* 129.

ethnographic data rather associates this type of fishing with the use of *chebe*, fish traps set for grass goby.[166]

In general, limitations on the use of fishing gear seem to be bound up with the reproductive circles of fish and aimed at the protection of juvenile fish. The Senate's decree of 1425 specified that *trata* and *seraglia* were allowed only from mid-July to Easter, which fits with the seasonal suspension of juvenile fishing. From the beginning of the sixteenth century, such regulations appear in explicit connection with the protection of juvenile fish, as in 1503 when the Collegium of the Old Justice ordered the use of *tratte* and *bragagnine* to cease from mid-February until September 29 to spare juvenile flounder.[167] In line with this trend is an increasing emphasis on the density and size of net mesh from the late fifteenth century on.[168] The most pronounced reasoning for this was given by the *Savi sopra le mariegola* when they took over the fishing regulations in 1577. According to them, fishing with *trata* and *trattolline* with very dense mesh caused the "*grandissima destruttion de pesci novelli et piccioli*", which become entangled in these nets and die prematurely.[169] Furthermore, a sample piece of net of the permitted mesh size was placed on display in the office of the *Giustizia Vecchia* in 1589, and the Collegium, and later the Senate, strongly emphasized that the Judges were responsible for certifying fishermen's nets in accordance with this exemplar.[170] In addition, trawl nets like *ostregher* were blamed and banned because of the harmful effects they had on the seafloor, that is, the primary habitat of the juvenile fish.[171] Potentially, bottom trawling also damaged the benthic community and submerged aquatic vegetation, the primary habitat of several lagoonal residents including the grass goby.[172]

[166] "*La pesca in Laguna*," Cralt Magazine, updated 23 June 2019, https://www.craltmagazine.it/la-pesca-in-laguna-1399.html; *La pesca nella Laguna di Venezia*, 53-54.
[167] *Capitolari,* BNM, ms. It. VII 1572 (7642), f. 188r.
[168] The earliest mention in 1492: *Capitolari*, BNM, ms. It. VII 1572 (7642), f. 188r.
[169] *Capitolare Rosa,* ASV, Giustizia Vecchia, b. 5, r. 12, f. 15v-16r.
[170] *Capitolari*, BNM, Ms. It. VII 1572 (7642), f. 195r.
[171] *Capitolare Rosa*, ASV, Giustizia Vecchia, b. 5, r. 12, f. 16r.
[172] "Effects of Trawling and Dredging on Seafloor Habitat," *Effects of Trawling and Dredging on Seafloor Habitat*, eds. National Research Council (Washington DC: The National Academies Press, 2002), 20-21.

The provisions of the Venetian authorities restricted the use of certain fishing equipment not only according to the season, but also in geographical parts of the lagoon. Although early limitations were applied to separate patches of the lagoon such as a rather limited section from the island of Santo Spirito to the Lido, the regulated area grew fast over centuries, stretching from Portosecco to Treporti in the fifteenth century and from Malamocco to Lio Maggior in the sixteenth. By the beginning of the seventeenth century, this area encompassed the lagoonal waters from Chioggia to Lio Maggior and, thus, included three main inlets which supplied the inner lagoon with a continuous influx of marine water — Lido, Malamocco, and Chioggia — with particular focus on marshes and mudflats (*barene*). Some of these regulations explicitly regarded fishing with *trata* and *grisiole* in this area as harmful to fish stock based on expert advice of the *Nicolotti*,[173] nicely fitting the natural realities of the lagoon where mudflats and tidal creeks were used as a nursery area by these migrant species.[174] In this case, however, protection of juvenile fish was not the only — and not the most acute — issue.

As mentioned above, the sixteenth century in Venice was marked by a growing concern of the Venetian patricians in relation to progressive sedimentation which was threatening to turn the lagoon into a swamp. Although the Venetian hydraulic projects of the sixteenth-seventeenth centuries managed to reverse this process, facilitating the development of a truly lagoonal environment, this long-lasting view of mudflats and sandbars as a frightening sign of degradation prevailed among patricians long before and after the sixteenth century. This put fishermen and even more so fish farmers in the disadvantageous position of being renowned troublemakers, since these very same sandbars and tidal flats and muds were essential to their occupation. Thus, banning the use of *ostregher* on the mudflats and marshes in 1577, the *Cinque Savi sopra le Mariegole* did not only blame it for erosion of the seafloor and tidal muds; they

[173] For instance, see the provision issued by the Council of Ten in 1424: "che non si possa pescare da Treporti a Portosecco con tratte e grisiole, essendo questa una delle principali cause che cagionano la mancanza del pesce": *La pesca nella Laguna di Venezia,* 21; Zago, *Nicolotti,* 132.
[174] Franzoni, "Fish assemblage diversity," *Rendiconti Lincei* 21 (2010), 278.

also associated this "new and very harmful method of fishing" with alluviation of the canals. According to them, the *ostregheri* "bring mud into the waters [of the lagoon], which gradually transport this additive into the canals; [this movement] alters the canals, as everyone can already see, and inlets are disturbed and endangered [by it]."[175] It was, however, the *grisiole*, the essential tool of the fish farmers, which attracted the most scrupulous attention of the Venetian authorities.

3.5 Fishponds

It would be wrong to translate *valle* exclusively as "fishpond", as sometimes this name referred to the privately-owned naturally formed shoals used for recreational hunting and fishing (e.g. *Hunting on the Lagoon* by Carpaccio). However, administrative sources usually deal with the *valli da pesca*, that is, the areas enclosed with soil or sand embarkments, and fences built from reed or poles.[176] The very morphology of the shallow Venetian Lagoon facilitated construction of these enclosures, primarily used for fishing and fish farming. The so-called *barene*, natural sandbars covered with water only during strong rising tides, formed the first borders of the *valli*. These sandbars were then enhanced by reed hurdles called *grisiole* ranging from ca. 0.7 m to 3.47 m in height.[177] Bound with swamp grass, these hurdles were relatively porous to provide the flow of water, allowing juvenile fish to enter the ponds. In other cases, fish farmers imported live juveniles caught outside the enclosures to eventually harvest the adult fish with the help of these same *grisiole* and *seraglia*. Although profitable for the patrons of the *valli* and beneficial for the city from the point of view of sustenance, the prevailing attitude among the aquatic resource officials was rather suspicious due to the possible negative effect that sandbars and hurdles might have had on processes of sedimentation and

[175] *Capitolare Rosa*, ASV, Giustizia Vecchia, b. 5, r. 12, f. 16r.
[176] *La pesca nella Laguna di Venezia,* 167.
[177] *La pesca nella Laguna di Venezia*, 162.

subsequent shallowing of the Lagoon. Given the Venetian officials' awareness of this problem, which guided almost every decision they made about the Terraferma and the lagoon, it is not surprising that by the beginning of the sixteenth century, they concentrated the power to improve the lagoon in the hands of one institution involving the highest republican officials.[178]

Starting from the second half of the fourteenth century, the use of these reed hurdles was repeatedly restricted, extending to further off areas of the Lagoon. The first known decree was issued in 1365 and prohibited fishing with *grisiole* and "any other instrument [made] of reed or poles" in the waters stretching between the islands of Lido, Santo Spirito, and San Marco in Boccalama,[179] which, according to the later regulation of 1393, did not include privately owned fisheries.[180] In 1425, the Senate extended the aforementioned area to the north, banishing *grisiole* between the port of Malamocco and Treporti, as well as from this area toward Venice proper, so that "the waters could enter [the lagoon] and leave without any impediment."[181] Finally, the degree of the Council of Ten was issued in 1502 to force private owners of the *valli* of Malamocco to stay inside the confines of their possessions and free the canals from the hurdles, as "*le acque non hanno il suo libero corso*", cites an earlier decision of the Senate (1494) which restricted the use of *grisiole* between the port of Chioggia and Lio Maggiore.[182] These three subsequent decrees, thus, draw a line outlining the three main ports of Venice, which served and continue to serve as points of entry for both ships and the salt waters of the Adriatic, providing a "healthy" influx of marine waters so desired by the Venetian governors.

Whether *grisiole* indeed posed a substantial impediment to the seawater flow is not clear. On the one hand, artificial constructions in the shallow lagoonal waters can indeed obstruct the

[178] However, the creation of the *Savi alle acque* by order of the Council of Ten can also be seen as a sign of the growing power of this council, which was sometimes said to implement centralizing reforms. This process ceased in the 1580s by the reduction of the Ten's authority in order to maintain the internal balance within the Venetian governing body: Mathieu, *Inselstadt Venedig*, 73.
[179] *Summario in proposito di valli,* ASV, SEA, b. 126, f. 2r.
[180] *Summario in proposito di valli*, f. 2v.
[181] *Summario in proposito di valli*, f. 3r.
[182] *Summario in proposito di valli*, f. 3v; ASVe, *Senato Terra*, r. 12, 17 March 1494, f. 47r.

infiltration of the marine waters and disturb the hydraulic balance. Lorenzo Bonometto cites a proverb commonly known in the Venice Lagoon, *palo fa palude*, a pole creates a marsh, and, drawing from the present-day data, confirms that

> "The traditional pile fence creates reflected waves that cause depressions and start destructive processes in the perimeter mudflats. In addition, the piles…hinder the salt marsh margin regenerative processes and the infiltration of water, thus opposing the normal dynamics and therefore also the restoration of protective and self-stabilizing capabilities."[183]

On the other hand, it was a primary interest of the fish farmers to provide a continuous influx of marine water to the fishponds, as the replenishment of fish stock and saturation of water profoundly depended on it. Apparently, the *Savi alle acque,* charged with the duty to carry out regular examinations of the lagoon, had their doubts on this matter as well. In the 1520s, they launched an investigation of the effects of *grisiole* and *valli* in general, seeking opinions of the local authorities from the lagoonal islands.[184] Surprisingly, three governors of the ports of Malamocco, Lido, and Venice provided a rather positive assessment of the fishing enclosures. In general, they saw the main benefit of the *valli* in that they favored the proliferation of ponds filled with saltwater all around themselves and between the canals, thus, facilitating the water flow between natural shallows and preventing their subsequent paludification. Alvise Bressan, admiral of the port of Lido, emphasized that the *grisiole* of the fishponds caused waters to rise and replenish the canals, while his counterpart from the port of Venice, Giacomo Spiera, saw the *absence* of fishponds in the waters between Poveglia, Torcello, and Malorbo as causing the development of marshes and generally the increasing shallowness of the lagoon.[185] From the most elaborated opinion by Alvise Francesco Berengo,

[183] Lorenzo Bonometto, "Functional Characteristics of Salt Marshes (*barene*) in the Venice Lagoon and Environmental Restoration Scenarios," *Flooding and Environmental Challenges for Venice and its Lagoon: State of Knowledge*, ed. C. A. Fletcher and T. Spencer (New York: Cambridge University Press, 2005), 482-485.
[184] *Summario in proposito di valli,* f. 7r-9r, 7v-12r. There are also the original letters sent by Giacomo Spiera, admiral of the Port of Venice, and Alvise Berengo, admiral of the port of Malammoco, to the *Savi*: ASV, Savi ed esecutori alle acque, r. 126, f. 3-5 – however, the letters are shorter than the detailed opinions copied in the *Summario*. Hereafter the opinions are cited from the more elaborated copy.
[185] *Summario in proposito di valli,* f. 7r-7v.

admiral of the port of Malamocco, it becomes clear that it was the abandonment of the fishponds — due to the bans issued by the Venetian authorities among other reasons — which aggravated sedimentation. According to Berengo, in the area where the creation of the *valli* and use of *grisiole* was prohibited, the level of siltation had risen by more than 0.347 m over three years; the ten-year ban then resulted in almost 1 m accumulation of tidal sediment.[186] On the other hand, the proper maintenance of the fishponds which implied excavation of tidal sediment and its regular transport to the open sea carried out by the fish farmers prevented the growth of sandbars and alluviation in general.[187]

These expert opinions, supplemented by the first-hand experience of the *Savi* acquired in their inspections of the lagoon, seem to have had an effect on the subsequent fishpond regulations.[188] Thus, the printed provision of 12 August 1579 required the fishpond owners to start "pruning the trees, unmaking build-ups, and other impediments created in the places of this lagoon… so that salt waters can fill all the of it, from the Adige to the Piave", rather than to remove the *grisiole*.[189] Strangely enough, this did not change the views of the *Giustizieri*, who kept enforcing bans on *grisiole* throughout the sixteenth century. Thus, the fishpond regulations demonstrate that despite the information sources readily available to the Venetian patricians, long-established views on the causes of alluviation were hard to change together with the lack of integration between various Venetian magistracies once again resulted in inconsistent legislation.

3.6 The public benefit

One should not, however, mistake the concerns leading the Venetian magistracies to protect fish stock and prevent sedimentation for strictly ecology-driven ones, as this would be

[186] *Summario in proposito di valli,* f. 9v.
[187] *Summario in proposito di valli*, f. 10r.
[188] About these inspections: *Summario in proposito di valli,* f. 12r, 14v.
[189] *Summario in proposito di valli*, 19r.

an obvious anachronism. In promulgating the regulations discussed above, the authorities pursued two basic ends, to provide the people of Venice with staple food and to sustain the profits of the fishermen communities. For instance, the ban of 1503 on the fishing with *trata* and several other types of nets (discussed above) was based primarily on economic reasoning – the juvenile flounder caught with these nets was too lean and bony to attract customers on the fish market, so the fish rotted on the counters to be eventually dumped into the city's canals.[190] Although the damage these nets were causing to the fish stock was recognized, the main purpose of the regulation was rather to secure a continuous, predictable supply of adequate merchandise. The reason for the suspension of oyster extraction for the whole summer, on the other hand, was rather medical, as these bivalves were too thin at that time of the year and, hence, harmful to digestion. In 1577, the *Cinque Savi sopra le Mariegola* summarized this principle most explicitly, as the regulation of fishermen's activity, according to them, was crucial "*per abundantia della città et maggior beneficio de loro pescadori*".[191] As in the case of Lake Constance addressed by Michael Zeheter,[192] the preservation of the aquatic environment was understood in terms of providing sustenance for the urban community, and in order to do so, fishermen, as a part of this community, had to abide by the law.

Although in the long perspective, the limitations on fishing were beneficial for both the fishermen and the urban community in general, the low social and economic status of the fishermen left them badly exposed to natural disasters (plague, changing climate) and economic stagnation. These problems required alleviation which usually came in the form of concessions and exemptions. In the case of a pre-modern economy defined by the activity of guilds — as in the Venetian Republic — exemptions were granted to the generally more privileged fishermen's

[190] *Mariegola della Comunità di S. Nicolò all'Angelo Raffael de Mendicoli*, BMC, ms. Cir. 2790 (IV. 112), f. 8 extensively cited in Zago, *I Niolotti*, 131.
[191] *Capitolare Rosa,* ASV, Giustizia Vecchia, b. 5, r. 12, f. 16v.
[192] Michael Zeheter, "Managing the Lake Constance Fisheries, ca. 1350 - 1800," *Conservation's Roots: Managing for Sustainability in Preindustrial Europe, 1100–1800*, ed. Abigail Dowling and Richard Keyser (Berghahn Books, 2020), 154-177.

communities of the parish of San Nicolò dei Mendicoli, as well as those in Poveglia, Chioggia, and Malamocco. For instance, not all geographical limitations stemmed from the "environmental" reasons discussed above; in some cases, they were rather meant to secure fishing grounds for more privileged groups. In the case of the Nicolotti, the Venetian magistracies repeatedly confirmed their right to fish anywhere on the lagoon without any limitation including the waters surrounding Chioggia, Murano, Torcello, and Malamocco; even the rigorously enforced restrictions on the use of *grisiole* and *bragagna* were lifted for them.[193] Similar, though less substantial, privileges were given to the Poveggiotti. The provision of 12 May 1365 issued by the Great Council prohibited fishing with *cogolo* in the surroundings of the island of Poveglia.[194] It, however, made an exception for the Poveggiotti, the fishermen's fraternity from the same island, giving them exclusive rights to exploit their primary fishing ground. The Chioggiotti enjoyed the privileges connected to fishing on the fishponds which abounded in this area. An entry from the year 1492 found in the register of acts of the *Giustizia Vecchia* confirms an exemption given to the fishermen of the *valli* of Chioggia who "can catch flounder and grass goby with roe and sell it any time", notwithstanding two earlier bans from 1424 and 1425 which prohibited extraction of these two species during their spawning seasons.

Vallesani in general were granted certain indulgences required by their craft. For instance, it was only the fish farmers who could catch or buy juvenile gilt-head bream before the feast of St Jacob (July 15) in order to bring them to the fishponds.[195] However, this privilege was by no means a perpetual one, as only three years later, juvenile bream fishing for fishponds was banned.[196] In addition, *valli* represented a complex issue in terms of administration, as many were the private property of Venetian noblemen. Starting from the fourteenth century, the common rule was to allow the use of *grisiole* for private owners with the proviso that they

[193] Roberto Zago, *I Nicolotti*, 130-136.
[194] *La pesca nella Laguna di Venezia,* 21.
[195] *Capitolari*, BNM, Ms. It. VII 1572 (7642), f. 194v.
[196] *Capitolari*, BNM, Ms. It. VII 1572 (7642), f. 195r.

should keep the lagoonal canals free of these reed hurdles.[197] Over the two following centuries, with the expansion of the zone free of *grisiole*, the provisions of the Senate and then of the *Savi alle acque* repeatedly demanded dismantlement of hurdles built in an earlier time. The problem appeared when the fish farmers expanded their activities to the public canals, which might be explained by the higher concentration of fish there, especially during cold seasons.[198] This was obviously seen as impeding the flow of salt waters and contributing to the sedimentation of the lagoon. The sixteenth-century fines for fixing the hurdles in the canals show how serious this issue was considered to be. *Inter alia*, they included the expulsion of noble lawbreakers from the Great Council and other magistracies for five years and a five-year ban from the city for non-nobles.[199] However, as the document of 1577 shows, the *Savi sopra le mariegole* who rigorously sought to fight any type of excessive (in their view) privileges, eventually had to respect the traditional rights of the patrons of the *valli*, who were allowed to employ any kind of fishing equipment on their private property according to the "old custom".[200] Granting them their traditional freedoms in the use of nets with small mesh, the *Savi* did not fail to remind the patrons that everything should be done for the public — and their own — good:

> "We want to believe that the patrons of the *valli* and their employees do not want juvenile fish to be destroyed, but they will do everything to preserve it, so that it will grow to their profit and utility… and for the public benefit."[201]

However, there was little they could do to control this problem. The promotion of the public good faced impediments when it came to the regulation of private property.

[197] *Summario in proposito di valli*, 2v.
[198] Piero Franzoni, "Fish assemblage diversity," 276. Although cases of this sort are found only in the sixteenth-century sources, it would be too hasty to conclude that the fish farmers always obeyed the law previously and ascribed the change in their behavior to the cooling of weather associated with the Little Ice Age. The reason such documents appeared in the sixteenth century might have been the increasing attention of the Venetian legislators towards alluviation and/or loss of fifteenth-century textual sources.
[199] The date of the entry is missing; according to the context, this provision should have been issued between 1531 and 1544: *Summario in proposito di valli*, 5r-5v.
[200] *Capitolare Rosa,* ASV, Giustizia Vecchia, b. 5, r. 12, f. 58r.
[201] Ibid.

Since the Venetian authorities greatly appreciated the advice of experienced fishermen, the latter had the opportunity to lobby for their own interests. Roberto Zago describes two cases found in the registers of the *Giustizia Vecchia* at the beginning of the seventeenth century when the Nicolotti opposed the ban of 1600 on *passareri*, a trawl net used in flounder fishing, and the other one from 1609 on specific nets used to catch blotched picarel (*Spicara maena*).[202] In the first case, the fishermen rejected the alleged negative effect of the *passareri* on juvenile fish, as according to them, their mesh was too large to catch juveniles. Moreover, they did not fail to appeal to the sedimentation concerns of the Venetian elite by stating that these nets contributed to the clearing of sediment from the canals.[203] This clearly contradicted an earlier argument about trawl nets causing erosion of the seafloor and the destruction of the nursery areas (see above). In the end, the *Giustizieri* were forced to permit the use of the *passareri,* although with limitation on the weight of the lead sinkers and using boats without sails to reduce the trawling speed. In 1609, the Nicolotti again argued that the nets for picarel were absolutely safe for other species. If anything, it was the lack of experience of certain fishermen in handling these nets that caused the shortage of fish. Eventually, the city's immediate need for fish prevailed, and the use of nets was officially resumed. Apparently, by the beginning of the seventeenth century, the depletion of the fish stock was becoming evident, making it hard for the fishermen to provide for the city and themselves, and they resorted to the lobbying for their interests more often as the environmental conditions became all the more precarious.

By the start of the seventeenth century, the signs of progressing stock depletion or, at least, of significant yearly fluctuations in landings clearly expose themselves in the sources. It corresponds with the increasing dependence of the Venetian market on fish export from the Atlantic fisheries in the following centuries[204] and seems to be caused by the volatile climate

[202] Zago, *I Nicolotti*, 136-138.
[203] See the argumentation of the *Cinque Savi sopra le Mariegole* behind the ban on *ostregher* in 1577: *Capitolare Rosa,* ASV, Giustizia Vecchia, b. 5, r. 12, f. 16r.
[204] De Nicolò, *Del Mangiar Pesce*, 8.

of the Little Ice Age, ecological pressure of the growing in the first half of the sixteenth century population, and subsequent social turmoil which badly affected the cohesion of the traditional socio-economic groups (fishermen's fraternities and fishmongers' guild).

Conclusion

Venice's special geographic location on the lagoon has made fish a staple food for a burgeoning population, regardless of its social and financial standing. The recipes for fish dishes of the fishermen from Chioggia appeared on the pages of early modern cookbooks and were rendered suitable to be served on the elite table. Meanwhile, the elite demand for sturgeon in Venice proper pushed boundaries of ecological systems as far as the Don River and, later, the White Sea. The Venetian authorities sought to guarantee the wide availability of fish on the market by setting price limits and concentrating fish retail in the hands of the fishmongers' guild. Nevertheless, they could not avoid the fish shortage increasing over the centuries.

The fifteenth-century power peak of the Venetian Republic was in decline by the end of the sixteenth century, despite a short-lived revival of the Levantine trade in the middle of the century.[205] The rapid population growth in the first half of the sixteenth century caused by the influx of people from the former Venetian colonies lost to the advancing Ottomans increased ecological pressure on the environment of the lagoonal city.[206] The situation was aggravated by the increasing climatic volatility of the Little Ice Age manifesting in intensification of rainfall, general cooling, and irregular freezes of the Venetian Lagoon, whose environment was already precarious by definition. Seeking to control and — as it was believed — preserve this unstable environment for the benefit of the city, the Venetian decision-makers gathered information from those who by profession had an intimate practical knowledge of the lagoon, the fishermen and local governors. It does not come as a surprise then, that the regulations of fishing generally fit the reproduction circles of the target fish species, gilthead bream, European flounder, grass

[205] Frederic Lane, "The Mediterranean Spice Trade: Its Revival in the Sixteenth Century," *Venice and History. The Collected Papers of Frederic C. Lane* (Baltimore: The John Hopkins Press, 1966), 25-34 [first published in 1940].
[206] Brian Pullan, "Food for the City," *Venice. A Documentary History, 1450-1630*, eds. David Chambers, Brian Pullan (Oxford: Blackwell Publishers, 1992), 105-106.

goby, and grey mullet. Over the centuries, Venetian "environmental" legislation became increasingly complex and plentiful; it tended to ban ever more types of fishing equipment and suspend fishing activities on the lagoon for longer periods. On the one hand, this strategy fits a picture of successful natural resource management, based on "strict and far-sighted administrative orders, daily and continuous efforts to tame individual interests in favor of the common good of the waters and the city", in words of Piero Bevilacqua.[207] The situation, however, appears to have been more complex.

The Venetian authorities had to navigate between public and private interests, meanwhile lacking consensus on certain things even between themselves. The fishing regulations they repeatedly issued necessarily had numerous exemptions to them with respect to the traditional rights of the fishermen's fraternities and private owners of the *valli*. Traditional socioeconomic groups of fishermen and fishmongers seem to have gradually abandoned their responsibilities of providing affordable products to their fellow citizens in an era of climate fluctuations, plagues and political upheaval. Moreover, the increasing number of the environmental regulations from the 1570-s onwards with the periodical extension of fishing suspension periods correlates with the fish supply crisis attested in the fish market regulations analyzed in the second chapter. Whether these issues stem from the fifteenth century, as Faugeron suggested, is not clear, as the character of the fifteenth-century legislation does not qualitatively or quantitatively differ from that of the fourteenth century. By the start of the seventeenth century, however, the fish stock depletion is clearly pronounced in the sources indicating the failure of the pre-modern Venetian environmental legislation to secure local aquatic resources. In the following centuries, the local fish supply had to be significantly supplemented with the export from the Atlantic fisheries, Istria and Comacchio.

[207] Piero Bevilacqua, *Venezia e le acque,* 69.

This hypothesis, however, must be tested on a wider scope of sources, including the ichthyoarchaeological ones, if available, not only from Venice proper, but from all over the northern Adriatic. If indeed it was the impact of the Little Ice Age that caused increasing *carestia* on the Venetian fish market, then the Istrian fisheries must have been affected as well. Considering the economic aspect of this research, the sixteenth-century prices on fish should be supplemented by more sources, compared with other foodstuff and built in wider context of the Venetian economic history. Thus, further research should take on a multidisciplinary approach involving history, zooarchaeology, and ecology to deepen our knowledge of the past environmental problems, as their repercussions still echo over the Venetian Lagoon.

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Glossary

***Braganga**:* Venetian, lead-weighted trawl nets, dragged behind boats of the same name

***Chebe**:* Venetian, fish traps set for grass goby

***Cogoli**:* Venetian, a cylindric seine net with wings, predominantly used in the canals for goby fishing

***Fossina**:* Venetian, a multi-toothed fishing harpoon used for grass goby fishing

***Grisiole**:* Venetian, reed hurdles used in the fishponds

***Ostregher**:* Venetian, a type of trawl net

***Seraglia**:* Venetian, *a surrounding seine net*

***Trata**:* Venetian, a trawl net weighted with lead, up to 30 m in length

Appendices

Figure 1: Environmental regulations of fishing in early modern Venice

Date	*Magistracy*	*Fishing equipment banned*	*Species suspended*	*Season of suspension*	*Part of the lagoon*	*Source*
8/03/1314	The Council of Ten		Grey mullet	Until June 29		*La pesca*, 21.
24/03/1314	The Council of Ten	*Trata*, *grisiole*		Until June 29		*La pesca*, 21.
12/05/1365	The Great Council	*Cogoli*			Around the island of Poveglia	*La pesca*, 21.
12/06/1365	The Great Council	*Grisiole*, fishing nets in general			Between the islands of Santo Spirito and Lido	*La pesca*, 21.
28/05/1400			Gilthead bream, mullet	Not specified	From Portosecco to Treporti	BNM, *Cap.,* f. 186v.

24/05/1415	The Old Justice		Juvenile of grey mullet and gilthead bream			
22/08/1424	The Council of Ten	*Trata, grisiole*			From Treporti to Portosecco	*La pesca*, 21.
5/07/1425	Senate	*Tratte*, *seragli*		From Easter to July		BNM, *Cap.,* f. 186v.
21/09/1464	Senate	*Sardellare*				*La pesca*, 21.
7/05/1474	Senate	*Grisiole*				*Senato Terra,* r. 7, f. 37r.
22/07/1485	Senate	*Grisiole*				*Senato Terra*, r. 9, f. 152v.
7/03/1491	Senate	*Trata, chiusure* (might be the				*La pesca*, 21.

		other name for *grisiole*)				
7/05/1492		*Tratte, trattolini; Serragle, cogoli* with reduced mesh size	Grass goby and flounder with roe	From Easter to July 25 (St Giacomo)		BNM, *Cap.,* f. 188r.
22/09/1492			Exemption for the fishermen of Chioggia to fish for the grass goby and flounder despite the preceding provisions			BNM, *Cap.,* f. 188r.
17/03/1494	Senate	*Grisiole*				*Senato Terra,* r. 12, f. 47r.

14/11/1503	The Collegium of the Old Justice	*Tratte, trattolini, bragagnine*	Juvenile flounder	From the mid-Februaty to September 29 (St Michael)		BNM, *Cap.,* f. 188r.
		"On arm" method	Grass goby	From March to September 29 (St Michael)		
19/09/1577	5 Savi sopra le mariegole	*Cogoli, trata, trattolini,* Nets with narrow mesh	Barbel, tench, carp less than 3 ounces		At any place where freshwater fish is caught	BNM, *Cap.,* f. 190v-191r.
22/09/1585		*Bragagna*	Juvenile fish	October	Around bridges and in the lagoons	BNM, *Cap.,* f. 194v.
13/09/1586	Senate		Juvenile, except for gilthead	Until July 25 (St Jacob)		BNM, *Cap.,* f. 194v.

			bream for the fishponds			
28/05/1589	The Collegium of the Old Justice	*Grisiole, trattoline, trata* with dense mesh; *bragagna*		From Easter to July 25	On the lagoon, marshes; the area between the ports of Malamocco and Castello	BNM, *Cap.,* f. 195r.
		"On the arm" method, *fossina*	Grass goby			
			Gilthead bream including the juvenile for the fishponds			
		Ostregher	Flounder			

4/06/1589	The Collegium of the Old Justice	*Bragagna* with dense mesh; The net should be approved by the Giustizieri and it should fit the example kept in their office		From Easter until 20 June	The area between the ports of Malamocco and Castelli	BNM, *Cap.,* f. 195r.
20/07/1589	The Collegium of the Old Justice		Oysters	Summer		BNM, *Cap.,* f. 195r.
12/05/1590	Senate	*Grisiole, cogolo, trata, trattoria, bragagna*	Juvenile		From San Pietro in Volta to Treporti	*La pesca*, 21.
10/07/1590	The Old Justice		Oysters	Summer		*La pesca*, 24.
26/05/1598	The Old Justice	*Trattoline, trata* with	Goby fishing "on	From Easter to	In the lagoon,	*La pesca*, 24.

		dense mesh; *bragagna; ostregher*	the arm" and with *fossina*; gilthead bream.	July 24 (St Jacob)	marshes and mudflats; the area between the ports of Malamocco and Castelli	
16/07/1598	The Old Justice	*Trattoline, trata* with dense mesh; *bragagna;* any type of nets whose mesh does not fit the example kept in the Office of the Old Justice		From Easter until 20 June	In the lagoon, marshes and mudflats; the area between the ports of Malamocco and Lio Maggiore	BNM, *Cap.,* f. 195r-195v.

			Juvenile flounder	Until the beginning of December		
4/06/1598	The Old Justice	Concession made to the fishermen of Murano to use *bragagna* throughout the year, except for the period from Ester to the end of June				BNM, *Cap.,* f. 195r.
29/09/1599	Senate	Nets whose mesh is denser than the exemplar kept in the Office of the Old Justice			From the port of Chioggia to the port of Lio Maggiore	BNM, *Cap.,* f. 195v-196v.

		Bragagna		August, May and June	The marshes from Chioggia to Lio Maggiore	
		Fossina and "on the arm" method	Grass goby	From Lent to the end of June		
		Oostregher, passerer		throughout the year	On the marshes and mudflats; the area from Chioggia to	

					Lio Maggiore	
		Ostregher, and any other sort of tools for catching oysters		April, May, June, July, August and September	On the marshes lagoons, beaches, main canals, and also inside the city of Venice, Canal Grande, and any other place	
30/03/1609		Bottom trawl nets	Blotched picarel			BNM, *Cap.,* f. 201r.
13/04/1626	The Collegium of the Old Justice	*Trata* denser than "of ten meshes"		From July 24 (St Jacob) until September	Marshes (of Caorle)	BNM, *Cap.,* f. 202r.

				29 (St Michael)		
		Fishing rods		From September 29 (St Michael) until Easter.	On the marshes (but allowed to use in the canals)	
		Aviziole (?)		During nighttime, from Pentecost until July 24 (St Jacob)		

		Grisiole		From Easter until September 29 (St Michael)	Everywhere, but it is allowed to fish with these nets in the middle of the lagoon	
		Eel nets		From Carnival until June 24 (St John)		
			Gilthead bream	From Easter until September 29 (St Michael)	Neither on the marshes, nor on the canals	

12/09/1635	The Collegium of the Old Justice		Juvenile fish	From March until July 24 (St Jacob)	The area between of Ponte di Goro to Ponte di Piave	BNM, *Cap.,* f. 202v.

Figure 2: Present state of the Venetian Lagoon with the geographical locations mentioned in the thesis

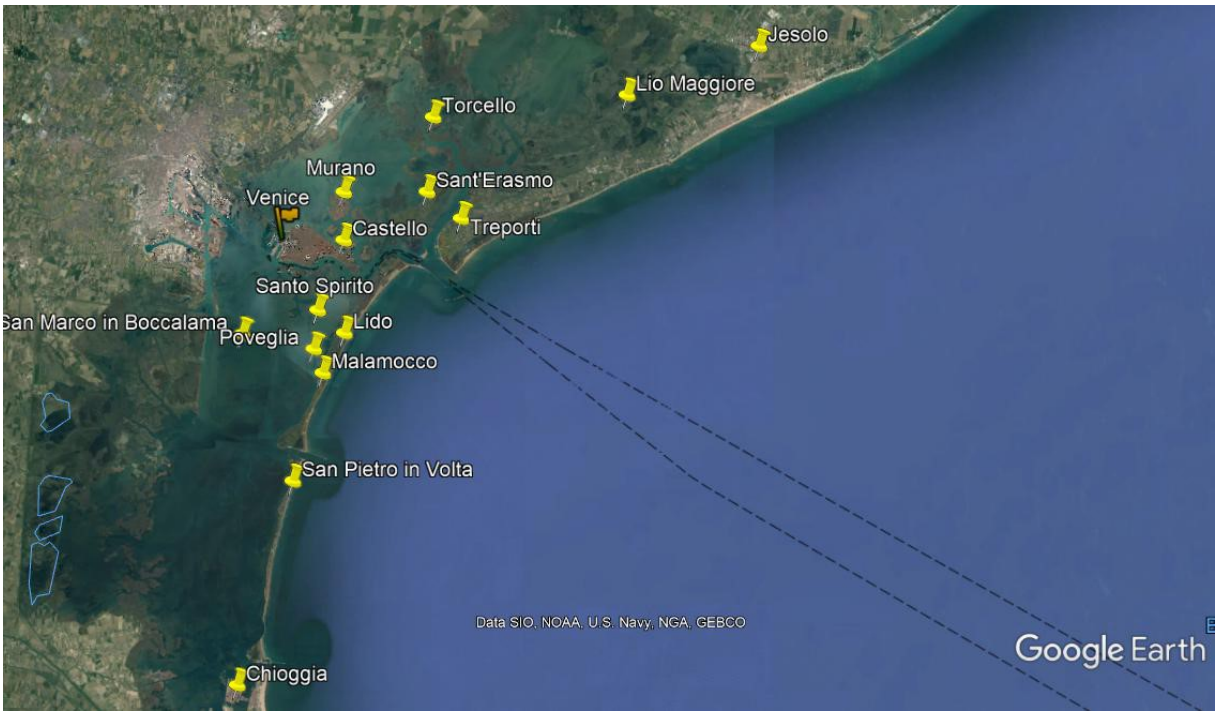

Figure 3: Venice in Georg Braun's Civitates orbis terrarum *(Köln, 1593). Courtesy of Universitätsbibliothek Heidelberg.*

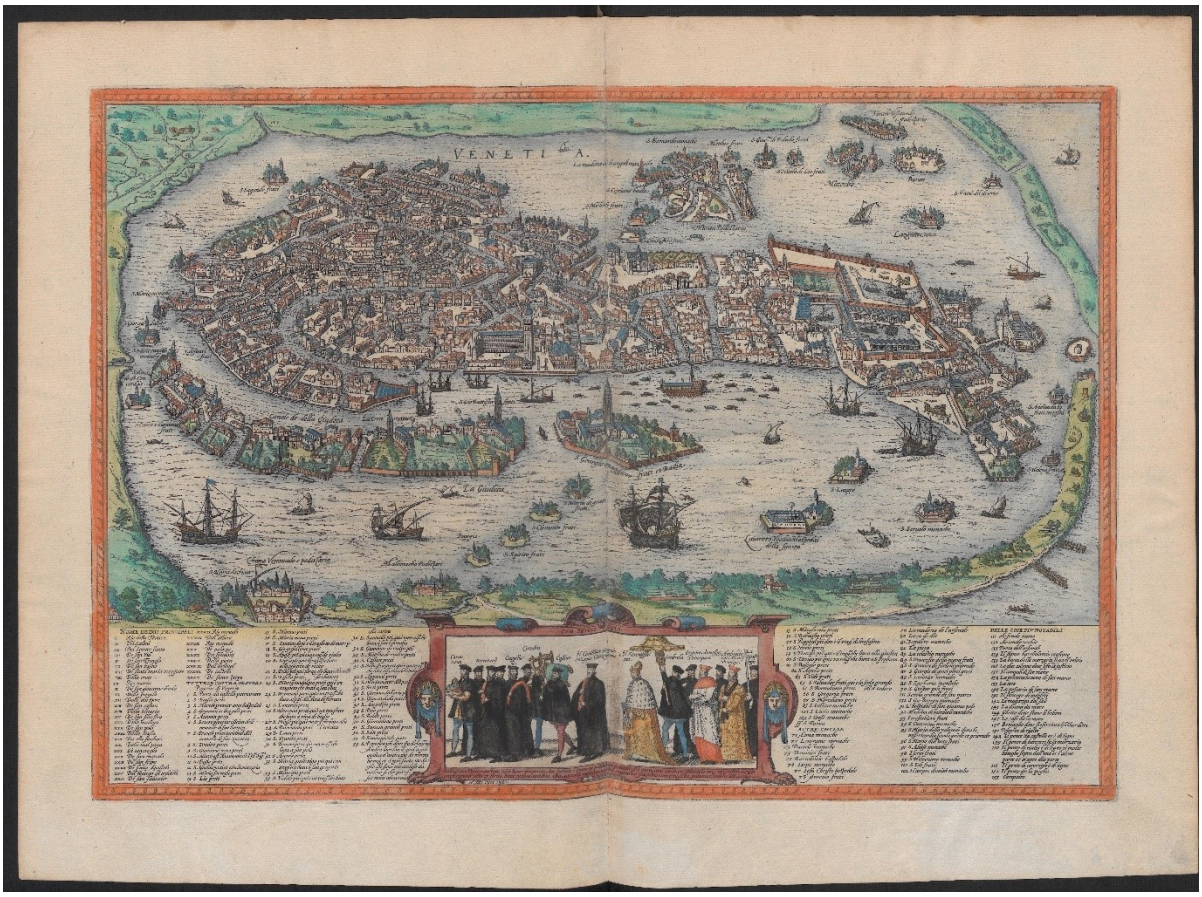

Figure 4: Cogolo. *Courtesy of Polo Museale del Veneto*