

03

Water Management in Early Modern Venice

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Notes

This lesson provides an overview of some key aspects of the transformation and management of the Venice Lagoon from the viewpoint of the history of science and technology, with a particular focus on the early modern period.

In 1715, the mathematician Bernardo Trevisan published a treatise entitled *Della Laguna di Venezia* (On the Venetian Lagoon). In this book, the author – a *patrizio* (patrician) of the Republic of Venice and one of the foremost hydraulic experts of his time – described and discussed the most important measures taken by the Serenissima (the ‘Most Serene’ Republic) in its centuries-long effort to preserve the fragile balance between land and sea on which its power and glory rested.

For the most part, this far from simple endeavour involved relatively small-scale but constant (and undoubtedly laborious) works such as periodical dredging and the building and maintenance of channels, *embankments*, and dams. However, when the need arose, Venice did not hesitate to undertake major works that, at the time when they were carried out, broke new ground in the development of the art of hydraulic engineering. Such was the case with the diversion of the course of the main rivers and streams that flowed directly into the Adriatic Sea from the mainland – and which often posed a serious threat to the very existence of the Lagoon.

Trevisan’s book is embellished with an allegorical frontispiece that can be seen as a wonderful embodiment of the environmental challenges faced by Venice since its legendary rise from the ashes of the Roman Empire. In the engraving, two wrestling figures (a boy and a girl, representing the land and the sea) try to force each other back into their respective domains. Above them, the phrase *Opponesi elemento ad elemento* (Two elements oppose each other) leaves little or no doubt as to how the scene should be interpreted.

It is interesting to note that here, the land (that is, the boy) seems to prevail over the sea. This scene may look odd to our modern eyes, used as they are to associating Venice with the notorious flooding problems that afflict the city today. But the anachronistic ‘reversal of power’ depicted on the plate should not surprise us: when Trevisan published his book, the most pressing environmental threat to Venice was the shoaling caused by the sediments carried and deposited in the Lagoon by the inflowing rivers. Had the engraving been done today, the frontispiece would have been quite different, of course – with the girl taking rather harsh revenge on the boy for his past bullying. And yet, despite the frequent (and often dramatic) changes in the battlefield that have occurred over the centuries, in this seemingly eternal conflict between land and sea neither side seems to have prevailed so far; nor has it ever been in Venice’s interest for either side to do so. In full accordance with this interest, Venice has always joined forces with the losing side and, from time to time, it has eagerly sought to avert the equally lethal risks of shoaling and submersion.

This prolonged effort had a series of interconnected consequences that have shaped Venice’s history, fortunes, culture, politics, society, and – last but not least – its landscape. The ‘hydraulic commitment’ of the Serenissima also found a concrete and enduring expression at the political and institutional level, with the establishment, in the early sixteenth century, of the *Magistrato alle acque* (Magistrate for the Waters): a powerful and long-lasting office (it outlived the Republic itself and continued, albeit intermittently, until 2014), whose board of experts was responsible

for water management in both the Lagoon and the *Domini di Terraferma* (the name given by Venice to its mainland domains).

And indeed, these experts proved to be equal to the task: in keeping with the solemn name of their institution, the water officers worked tirelessly to safeguard the Lagoon throughout its long existence. And (as a non-secondary consequence of this struggle) they also contributed to making the Republic of Venice a European hub for scientific and technological innovation. Specialists in hydraulics, mathematicians, engineers, geographers, natural philosophers, miners, explorers, craftsmen, even fishermen and carpenters: in that northernmost corner of the Mediterranean Sea, the interaction of scholars and technicians – of *theorists* and *practicians* – fostered unparalleled levels of knowledge and expertise in the mastery of water and understanding of the hydrological cycle.

On the ‘scholarly’ side, the most tangible result of this feverish exchange of ideas and experiences was that Venice trained and attracted many protagonists of early modern science and technology. Their names are well known to historians of science and hydrology: Benedetto Castelli, Geminiano Montanari, Bernardino Zendrini, Antonio Vallisneri, Jacopo Riccati, Giovanni Poleni, and Domenico Guglielmini, to name but a few. These savants, in turn, contributed to the strengthening of cultural institutions and projects that for a long time made the Serenissima the beacon of Italian research. Just think of the University of Padua, one of the main theatres of the Renaissance and one of the leading universities in early modern Europe; or, in Venice, of the *Giornale de’ letterati d’Italia*, which was the first journal in Italy to have a special section devoted to science (a section in which, not surprisingly, the study of waters occupied a far from negligible place). These and many other centres of knowledge were both the expression and the propulsive force of the fruitful combination of *praxis* and theory that allowed the Republic to successfully manage one of the most fragile hydrogeological environments in the world, preserving its changing balance – and its beauty – far beyond the natural limits of its existence. In fact, it was thanks to this constant effort that Venice was able to promote and carry out pioneering projects that in many cases pushed the boundaries of the state of the art in water and land management – and which, at the time of their accomplishment, aroused amazement and admiration across the continent. This happened, for example, when the European powers witnessed the completion of the titanic *Taglio di Porto Viro* (1600-04): an unprecedented hydraulic engineering work that diverted the main branch of the Po River to the south of the Lagoon, drastically altering the evolution of the Italian Adriatic coastline, with long-lasting effects that are still clearly visible today. Or, on the (unfortunately recurring) front of warfare technology, let us think of the *galeas per montes* (galleys through the mountains), an audacious feat carried out in 1439 – when the Venetians, relying on their absolute control of the hydrographic network of north-eastern Italy, succeeded in transferring a fleet of warships from the Adriatic Sea to Lake Garda to move battle against the invading army of the Duchy of Milan.

It goes without saying that these (and many other) enterprises were not achieved without cost or controversy. For Venice, the need to remain at the technological forefront of water management in order to survive meant a constant drain on its human, natural, and financial resources. In some cases, the projects were so ambitious and pioneering that the water officers – in an unpleasant, but rather understandable, act of prudence – refused to approve them, mainly because of the technological, environmental, political (and therefore financial) risks that they posed. Inevitably, the rejections came much to the dismay of the proposers. In 1712, for example, the Franciscan friar Vincenzo Maria Coronelli (1650-1718) – who was the official cartographer and Cosmographer of the Republic – submitted a plan for a diversion channel that would connect the Adige River to Lake Garda, in order to prevent the notoriously turbulent river from flooding the plains of Verona and the Polesine. After a heated debate among experts, patricians, and other authorities, the project was

ultimately rejected. Not only was it technically challenging and too expensive, but it was also diplomatically risky: the excess water released into the lake would have led to more water in the outflowing Mincio River and thus to potential flooding in the neighbouring and Habsburg-ruled territory of Mantua.

As a posthumous tribute to Coronelli's foresight and talent, his proposal became a reality more than two centuries after his death, in 1959, when the young Italian Republic completed the Adige-Garda diversion tunnel. On the other hand, it is a tribute to Venice's prudence that this new project, too, was (and still is) met with harsh criticism from many experts and the public alike. But such is the price of change – and for the same reason, it should not surprise us that many other actions promoted by the Serenissima throughout its history ended up triggering political, economic, environmental, and social problems both within the Republic and with neighbouring states. As is often the case in water management, fixing a problem in one place means creating other problems elsewhere – and Venice has learned this lesson all too well, to the point that what the city is facing today in terms of environmental challenges and public controversies (just think of the MOSE project, the recent system of mobile dams introduced to regulate the waters of the lagoon) is in many ways perfectly in line with this tradition. Indeed, in the stream of professional and public debates that arose from – and in turn, shaped – Venice's efforts to manage an ever-changing environment, we can find an anticipation of the complex tangle of issues that we are facing today at a global level.

From this point of view, the history of water management in the Venetian Lagoon and on the mainland has much to teach us about what approach to adopt when faced with environmental challenges, an approach that is not necessarily *natural*. In fact, Venice and its beauty have survived for so long precisely because the Republic learned to adapt to a changing environment. It preserved artificially – and therefore *unnaturally*, and at a great cost – a landscape that was and still is destined to disappear by shoaling or submersion, and turning into land or sea. Although the choices made have not always been the wisest, Venice has managed to survive. And as its history shows, *unnatural* does not necessarily mean *bad* for the environment or for us. Flexibility was and is the key: a concept that applies to Venice as well as to today's global community.

Mandatory Reading

Omodeo, P.D.; Trevisani, S.; Babu, S. (2020). "Benedetto Castelli's Considerations on the Lagoon of Venice". *Earth Sciences History*, 39(2), 420-46.

Further Optional Reading

Luzzini, F. (2019). "Quando il Cannaregio si fece dolce". *Acque Sotterranee: Italian Journal of Groundwater*, 8(2), 75-7.

Luzzini, F. (2022). "The Floating Price of Beauty: Water and Land Management in Venice Through the Centuries".

Baldacci, C.; Bassi, S.; De Capitani, L.; Omodeo, P.D. (eds), *Venice and the Anthropocene: An Ecocritical Guide*. Venezia: Wetlands, 29-32.

Trevisan, B. (1715). *Della Laguna di Venezia*. Venezia: Lovisa.

Zendrini, B. (1811). *Memorie storiche dello stato antico e moderno della Laguna di Venezia*. Padova: Stamperia del Seminario.

