Intertwined Histories and Ecologies:
Early architectural and hydraulic treatises and practices in the Venetian Region
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Abstract

Looking critically at ecology, contemporary thinkers such as Bruno Latour, Philippe Descola, and Maria Puig de la Bellacasa make a case that the idea of nature has changed throughout history. This requires a new perspective that overcomes established divisions between humans and non-humans, moving beyond the dualism of nature and culture. Their contributions emphasise a new philosophical framework for an ecological vision that suggests alternate ways of working through them.

To define an imaginary narrative for cities and their territories, the thesis adopts the lens of the Arcadian discourse, meant as a narrative, historical and conceptual tool for unearthing ecological concepts in history according to three dimensions: the physical, the political, and the symbolic. Coined by Donald Worster through reading Gilbert White’s works, and rooted in Virgil’s works, this definition embodies a sympathetic approach towards nature, posing an alternative to imperialist approaches that assert dominance over nature.

This research focuses on the historical period between the 15th and 17th centuries, corresponding to rhetorical Arcadian naturalism in architecture, just before what Manfredo Tafuri defined as Enlightenment naturalism, and to the revival of the Arcadian genre in Italian literary works. Among these, Theogenius by Leon Battista Alberti explores a conception of nature that echoes Arcadian components in terms of their implications for architectural theory. Subsequent comparison with Daniele Barbaro’s Commentary provides an opportunity to move from the world of abstract ideas to the concrete matter of fact of Venice and its surrounding territory, which had always experienced the negative impacts of human beings on their environment.

Situating these discourses and their effects in the reading of early hydraulic theories, projects, visual and graphic representations, laws, and human and non-human stories related to Venice’s practices of land and water management, the re-articulation of contemporary ecological concerns has been prompted through a historical lens.
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“In this way, the mansions arranged along either bank of the canal made one think of objects of nature, but of a nature which seemed to have created its works with a human imagination.”

Marcel Proust, The Sweet Cheat Gone.
Introduction.
Venice, 22nd November 2022, the sound of sirens warns the inhabitants.\textsuperscript{1} History repeats itself over and over again: Venice is in danger! The forecasts accurately predict high tides because of heavy rainfall and scirocco winds. As was the case three years ago, the city again experienced a high tide of 187 cm, marking the second-highest level since 1872.\textsuperscript{2}

A similar weather condition was the cause of the event, which occurred just a few years earlier in 2019, and even more catastrophically in November 1966, when the sea water level in Venice reached 194 cm. Due to heavy rain, the entire Veneto and Friuli Venezia Giulia regions were flooded with water from the Adige, Brenta, and Piave rivers.\textsuperscript{3} The same event occurred in Tuscany, where the Arno overflowed, flooding cities like Florence, Grosseto, and Pisa during that time. One year earlier, the Tiber also overflowed. The Italian territory was devastated. (FIG.1 and 2)

Several headlines described the events of 1966 as an exceptional tragedy. However, this was not the full truth. Due to its hydrogeological configuration, Venice and other Italian territories have always been fragile, and subject to natural phenomena over centuries. They have since experienced an increase in the effects of environmental disasters because of climate change.

In addition to dozens of deaths and extensive economic damage, Venice and Florence experienced other loss-
es. Their cultural heritage was ruined by mud and water, with Italians and foreigners competing to clean and restore as many books, paintings, and other works of art as possible. This sign of affection marked a change of pace within civic society, rediscovering a sense of care for the Italian territory and its collective heritage, seldom seen outside an emergency context. As written beautifully by Marino Sinibaldi, an Italian contemporary writer, the 1966 flooding has brought back a sense of “we” that minimises “differences (between citizens) and aspires to the reduction of inequalities.” Since then, several public institutions and voluntary organisations have been set up to protect the Italian territory from these phenomena. Additionally, an increased awareness of ecological issues has generated a broader debate involving a variety of disciplines, including architecture.

In this vein, in 1972, Superstudio presented a radical project, *Salvataggio dei centri storici italiani*, in which six city centres, Milan, Florence, Pisa, Rome, Naples, and Venice, were radically reimagined. Devastating floods and high pollution levels became the baseline for each Superstudio proposal: Florence remains flooded, Milan is enclosed within a glass box full of polluted air, and Venice’s canals are covered with a glass floor to solve the problem of rising sea levels. What is fascinating about these reinventions outside the content of the proposals is Superstudio’s way of looking at nature and its transformation through culture. Nature is not considered simply in terms of a rural landscape, but the catastrophic effects caused by human interventions. Rather than
providing practical solutions, these projects aimed to raise a critical debate regarding the need for socioeconomic reforms and a change in behavioural models.⁶ (FIG.3)

However, something different occurred on November 22nd, 2022: the MoSe, a mobile dam located along Lido, Malamocco, and Chioggia, held back the high tide!⁷ Public officials, newspapers, and public opinion hailed the intervention as a victory over nature: Venice has been saved. Was this true? Does the MoSe reflect a resolute response to climate threats, or is it the result of a contemporary agreement between humans and the natural environment? Or does this intervention suggest an alternative contemporary conquest of nature?

The narratives surrounding this issue are partial, only focusing on MoSe without considering the more comprehensive strategic plans drawn up in 1973. Under public pressure following the 1966 flood, the Italian government enacted the Legge speciale 1973, a comprehensive plan to safeguard the city and lagoon from further damage, which had begun less than 100 years ago with the construction of a section of Porto Marghera in 1922, one of the largest industrial areas in Europe located only kilometres from Venice and continued into the immediate decades after the end of the Second World War. In 1968, the Canale dei petroli was completed to allow tanker ships to enter the industrial area from the Adriatic Sea, and the city airport was also constructed. These projects particularly brought the exploitation of the intertidal territories of barene, which had always been historically recognised as a crucial component of the survival of Venice and its lagoon’s
FIG. 1 Acqua alta in piazza San Marco. Venice, 2019.
FIG. 3 Superstudio, Salvataggio dei centri storici italiani, 1972.
ecosystem.⁸ (FIG. 4) In this regard, the figures APPX 1,2,3, and 4 illustrate this exploitation’s intensity, extent, and speed compared to previous centuries.⁹ Many areas occupied by the barene have been increasingly transformed into dry land or submerged in water. Several reclamations had occurred centuries before, but none affected the intertidal zone so greatly. One might think that the fragile landscape of the barene was meant to be preserved only as it was, unsuitable for human interventions. In contrast, hydrogeological studies conducted in the last decade have shown that the barene could adapt their structures to suit human interactions until the last century.¹⁰ Even the diversion of rivers during the 15th and 17th centuries did not significantly alter the barene’s ability to self-regenerate.¹¹ The barene, therefore, should not be considered through enclosed ecological patterns, but rather as an opening zone that resembles the respiratory organ of a living organism (a lagoon), fully intertwined with other elements and organisms in the landscape.¹² These landscapes embody the concept of the “Holocene patch” by Anna Tsing, staked in the preservation of “livability” following human interventions,¹³ since it is not a human intervention that has generated the contemporary ecological crisis in itself, but rather “the scale of human disturbance.”¹⁴ Furthermore, as Clara Zanardi claimed, the building of Porto Marghera, Canale dei petroli, and the airport caused “human reclamation,” gentrifying the historic local community, making clear the deep intertwine-ment of environmental and social aspects in the ecological discourse that surrounds Venice.¹⁵
As a result of the *Legge Speciale 1973*, the government launched a competition to identify a strategy for protecting Venice. The MoSe and a series of interventions would safeguard the entire Lagoon, while also recognising this habitat as an ecological system inclusive of the sea, land, rivers, mountains, and marshland. Despite its good intentions, the multileveled strategy outlined in the plan, which could have produced positive results, systematically ignored the protection of the *barene* and delivered the responsibility of protecting Venice solely to a technological apparatus.

Exploitation of the lagoon has continued, taking advantage of ununified purposes among regional, national, and local administrators. Positive results from such interventions would have required a coordinated set of local activities on the ground according to slow timelines, considering other temporalities and a reduction of individual interests, such as Philippine clam fishing made legal in the last decade.\(^{16}\) It would be defined today as a project of care for heritage, engaged in continuity with centuries-old approaches.\(^{17}\)

The MoSe does nothing more than confirm this direction toward increasing human transformation, perpetuating the same greedy “technocratic” logics applied to the exploitation of Venice’s territories and its lagoon in the last century.\(^{18}\) Since it cannot operate above a certain water level, it will quickly become obsolete, demonstrating its limited and short-term effectiveness. An interesting map designed by Martin Vargic in response to recent scientific predictions shows that the entire Italian *Pianura Padana*, like many other parts of the
FIG. 4 Aerial view of barene (salt marshes).
world, could be submerged underwater in the next 150 years. Venice could disappear entirely, whilst Vicenza and Naples could become islands, and Milan a seaside town. (FIG.5)

Many experts have pointed out that the continuous presence of the lagoon will serve as a barrier, effectively closing it off from the sea. Consequently, the lagoon will be transformed into a body of water devoid of its inherent characteristics as an interconnected vital organism. This fatal forgetfulness and inaccurate assessments perpetuate the false modern and anthropocentric idea that Venice can be saved if isolated from its territory, allowing its natural components to be exploited indefinitely.

“How can we not feel rather ashamed that we have made a situation irreversible because we moved along like sleepwalkers when the alarms sounded? And yet, we haven’t lacked for warnings. The sirens have been blaring all along.”

In this way, Bruno Latour cynically comments on humans’ slowness and stupidity in tackling ecological crises. Venice’s contemporary scenario could easily fit this description; the sirens have never stopped sounding throughout its history. If Venice represents one of the most magnificent encounters with a fluid and unstable environment, embodied in its stones and soft coloured plasters, vibrating facades, labyrinthine canals and calli, its history demonstrates how the nature of this encounter was a result of a complex and dynamic negotiation process, which has reshaped the city and its community continuously for centuries.

According to Elisabeth Crouzet-Pavan, the negotia-
tion process was not homogeneous and linear, but rather divided into at least two phases, each representing a different human relationship with a natural element. Even if based on a rhetorical narration that faded from the real arduous construction of the first settlements, the first phase corresponded with the mythological and sacred image of Venice. Traced back to the sixth century AD, Venice was seen victoriously emerging from the water and blessed by God, who protects its community and validates its destiny and glorious mission. 21

As a result, Venice’s peculiar relationship with the natural environment of water, considered a beneficial source of its political and economic fortune, has acquired a symbolic meaning beyond its physical manifestation in the patient construction and “reshaping” of the city, 22 generating its stability and promoting the ideals of civic harmony and peace. 23 These ideals created fostered a stable community deeply entwined between public institutions and private relationships, particularly in the early Renaissance. 24 Social integration was interconnected with the city’s surroundings and the delicate balance of its natural environment. The citizens and institutions “were aware of the close connection between their health and the lagoon’s integrity.” 25 As Dennis Romano pointed out, maintaining the cleanliness of canals, streets, and other common areas was vital for the city’s survival and proper functioning. These practices were historically rooted in the habits of the first distinct island communities responsible for the daily upkeep. Even after these communities were merged or divided into public administrative areas called sestieri formed by
grouping together a few parishes, these activities continued at a local level, overseen by public officials elected among from the nobles and citizens of the parish. 26 As a result, the principle of care, which relies on the reciprocity between people and nature, has become a special characteristic of Venice’s cultural and ethical discourse.

As claimed by Crouzet-Pavan, however, in the middle of the 15th century, the environmental “vocabulary” changed, and the natural elements that previously protected Venice began to be perceived as a threat due to the lagoon landfill process, which revealed the first dangerous effects of human exploitation of the mainland areas. 27 Venice was experimenting with its first “ecological disaster.” 28 This second phase was characterised, therefore, by a shift in Venice’s relationship with the environment, which was no longer perceived as symbolically significant but as a dangerous resource, which caused a desacralisation of “Venetian mentality by presenting the state, its magistrates, and their courses of action as capable of preserving the city and ensuring the survival of its inhabitants.” 29

In light of other historical events that weakened Venice’s political institutions and economy, the necessity to defend the city from nature’s dangers became part of the new political agenda. This change was inaugurated by Andrea Gritti in the first decade of the 16th century, along with the redefinition of institutions, hierarchisation of social structures, and renewing of the city landscape through the construction of new buildings, public spaces, and the reclaiming
of new lands to extend the city’s boundaries. This period has been called the “age of water” by Crouzet-Pavan, since it was characterised by extensive hydraulic and centralised interventions, supported by developing hydraulic science that promised efficient solutions.

As Manfredo Tafuri has claimed, “Venice tried to endure within her origin,” assuming a further peculiar approach which consisted of integrating elements belonging to its historical legacy into its dealings with the environment, such as empirical and collective practices, with others based on new scientific discoveries that seemed more responsive to the new needs. Tafuri has described this ability as Venice’s “prudentia.” This latter “guaranteed Venice’s persistence within her origin; prudence constituted the measure of “good government,” founded criteria of justice, enabled tradition to “resist” within the new, and enabled the new to live in an uninterrupted cosmic time.” Tafuri mentioned this about city transformations and the introduction of new mental structures and architectural orientations not inherent to the history of Venice. However, it could easily be applied to critically understanding transformations of the lagoon and the activities intended to protect it. For instance, the principle of care, which constituted the very foundation of the early communities, and had little to do with the developing science of hydraulics, continued to permeate the spirit of Venice’s political agenda.

In this sense, Venice’s history “exemplifies (…) the slow, arduous process of learning to deal with the elements
of nature,” where the combination of techno-scientific solutions with empirical and local practices, passed down from generation to generation, was an integral part of an anti-literam ecological broader vision comprising an “ethico-political articulation, between the three ecological registers, the environment, social relations and human subjectivity.”

Research question and hypothesis.

Therefore, Venice represents a clot - “a microcosm of man’s relation to the environment,” where contemporary ecological crises are condensed today. At the same time, it marks a most magnificent encounter between nature and humanity, mediated through centuries of struggle and negotiation between opposing forces. For this reason, it embodies a most critical and central issue in contemporary ecological debate: the dialectic between nature and culture and its mutation resulting from new philosophical understandings of nature.

As Latour has claimed, “nature does not exist (as a domain) [anymore]; it exists only as one half of a pair pertaining to one single concept. We must thus take the Nature/Culture opposition as the topic on which to focus our attention and not at all, any longer, as the resource that would allow us to get out of our difficulties. (…) If ecology sets off panic reactions, we now understand why: because it obliges us to experience the full force of the instability of this concept [Na-
ture], when it is interpreted as the impossible opposition between two domains that are presumed actually to exist in the real world.” In light of a new awareness, many others have also highlighted the necessity to re-examine the dialectical relationship between nature and culture. Debates focus on how to deal with this instability of the dialectic couple, including the possibility of reconciling it, going beyond it, embracing a “formation of new ecologies” out of the disturbances, and getting around it.

Incorporating these concerns into architecture, a first research question emerges clearly since it can be considered one of the involved disciplines in environment transformations, and cities and territories are significant outcomes of the relationship between nature and culture.

How does the contemporary instability of the nature/culture relationship affect cities, territories and their future imaginaries?

Therefore, Venice’s unique approach to its environment throughout history guides my preliminary hypothesis that the legacy of the past, its concerns, principles, and correlated practices may serve as a basis for addressing the contemporary modification of the nature/culture relationship that affects cities, territories, and their future imaginaries.

Adopting this perspective means moving back “against the current,” as Michel Foucault states in the introduction to The Order of Things. Here, he explains how to
navigate history to identify multiple, non-linear directions of “empirical, non-exact and uncertain kinds of knowledge based on evidence of unstable discourses” in the human sciences.\cite{foucault1972}

He examines “language as it has been spoken, natural creatures as they have been perceived and grouped, and exchanges as they have been practiced,”\cite{foucault1972a} without attempting to maintain disciplinary divisions or force temporal linearities, but rather embracing differences and similarities to unearth as many regularities as discontinuities.\cite{foucault1972b} His “analysis does not belong to the history of ideas or science,” nor corresponds to an idea of history as its “growing perfection”, but rather looks for “configurations within the space of knowledge which have given rise to the diverse forms of empirical science. Such an enterprise is not so much history, in the traditional meaning of that word, as an archaeology.”\cite{foucault1972c} In this sense, Foucault’s epistemological research informs the methodological direction of this hypothesis, since it implies a kind of archaeological exploration that digs into history, certain ideas, practices, and cultural realities to unearth multifaceted traces that might have prepared the ground for contemporary ecological discourse. This latter point is perfectly suited to Foucault’s type of investigation, since it can be meant as an extension of the nonlinear development of sciences of life (natural science and biology) drawn by Foucault.\cite{foucault1972d} Even more so, contemporary ecological discourse urges to imply multiple layers of observations and “registers,”\cite{foucault1972e} and interlace various disciplines, such as art and science,\cite{foucault1972f} making it close to what Foucault defined as the “middle region” of the knowledge.\cite{foucault1972g}
This preliminary hypothesis, however, directs me to examine the connection between history and contemporary ecological issues looking beyond the city of Venice. This research will broaden its scope - even as Venice remains a thread in the narrative throughout - by exploring a variety of possible trajectories from a geographical, temporal, and disciplinary perspective.

As an initial step, I embark on the exploration of contemporary ecological and philosophical discussions concerning the interplay between nature and culture, situating them within the expansive realm of architecture. This undertaking is anchored in an initial comparative analysis of two texts authored by Bruno Latour and Manfredo Tafuri. Latour contributes a profound theoretical insight into the dynamic interaction between nature and culture and the evolutionary trajectory of their relationship over time. Through his investigative perspective, one can grasp historical junctures indicating a shift in the orientation of this relationship, representing a paradox of modernity. Tafuri’s research, on the other hand, aids in placing Latour’s insights within the historical narrative of city development.

Through this theoretical framework, I further specify the object of the research object and its temporal framework. Subsequently, this will enable me to define a research method and turn my research hypothesis into the research argument before beginning my historical investigation.
Latour identifies a paradox in the relationship between nature and culture as it has developed over time. A process of modernization is alleged to have occurred through the existence of two worlds and related practices: the first world is made of hybrid elements (networks, quasi-objects), a blending of nature and culture, the result of a “translation process;” then, a second world (of criticism) is composed of two separated ontological zones (humans and non-humans), defined through a “purification process” of all objects and thoughts in the world. 51

To be Modern, the two practices (translation and purification) are coordinated across two dichotomies: the first represents the division between the hybrid world and the two ontological zones, and the second stands for an internal division between the two ontological zones. The paradox of modernity lies in its proliferation of hybrids (of nature and culture) and their subsequent categorisation into pure nature and pure culture. This paradox rests on two denials: the first concerns the denial of the hybrid world as an autonomous entity. Unlike in pre-modernity, the preponderant entrance of science generates and proliferates hybrid-objects that belong to a reproducible and immanent nature (artificial) which becomes subject to transcendent culture like never before. Latour’s second concern relates to the denial of any interference in the purification process of the hybrid world, framing it as a world belonging
entirely to a human or non-human category. The paradox of modernity, therefore, is the delegitimization of the status of objects as a product of the interference between nature and culture in the interests of economic rationality, scientific truth, and technical efficiency, which are based on a universal and unique anthropocentric perspective. Contemporary ecological issues dwell in this delegitimization. As Latour further specifies, the current ecological crisis belongs not to the natural world, but rather to hybrid objects. An acceleration of the paradox of modernity defines a historic watershed which still affects our perspectives today, questioning:

“Won’t modernization become impossible? Are we going to become – or go back to being – premodern? Do we have to resign ourselves to becoming antimodern? For lack of any better option, are we going to have to continue to be modern, but without conviction, in the twilight zone of the postmods?”

Latour attempts to provide a horizon by which this paradox can be subverted in the process of “Redistribution.” Except for antimodernism, “Humanism Redistributed” might be the result of contributions from each and every historical period. Concerning the moderns, Latour embraces their capacity to proliferate hybrids, extend the length of networks, speed up the production of traces, and, above all, maintain “their daring, their research, their innovativeness, their tinkering, their youthful excesses, the ever-increasing scale of their action, the creation of stabilized objects independent of society, the freedom of a society liberated from objects.”

Regarding the premoderns, Latour instead takes up
their “inability to differentiate durably between the networks and the pure poles of Nature and Society, their obsessive interest in thinking about the production of hybrids of Nature and Society, of things and signs, their certainty that transcendences abound, their capacity for conceiving of past and future in many ways other than progress and decadence, the multiplication of types of nonhumans different from those of the moderns.”

In this research, the relevance of some aspects of the moderns’ contributions, such as the increasing scale of human perspectives and investigations into the production of hybrids and networks, is not denied. The reader will be able to glimpse them through the description of the birth of a technical hydraulics discipline and the mathematical study of natural phenomena, such as the motion of water in rivers and the studies on erosions of riverbanks. However, the contributions derived from premoderns, such as the ability to construct different temporalities, consider the link between things and signs, and, above all, explore multiplicities of nonhuman actors, crucial in supporting the process - of “Humanism Redistributed” - which Latour outlines. Above all, this suggests that human beings can act as “mediators” between others, not in opposition, but as their ally, intertwining with them in a process, which Latour defines as morphism, as an evolution of the precedent concept of anthropomorphism.

At this point, a question arises: is it possible to analyse the city from Latour’s perspective, using, for instance, the concept of the hybrid-object? And even more importantly, is
it possible to analyse the implications of the modern paradox by applying it to the study of city development throughout history? My first step is to demonstrate the validity of Latour’s perspective when applied to cities and territories developments throughout history, then determining how and through what theories and urban interventions the modern paradox can be observed. Considering the city of Venice, for instance, as a constant series of interventions performed on the soil and water, it is easy to see how it might be regarded as a hybrid object.

As described in “Levelling the Land” by David Leath-erbarrow, the Greek myth of Chthonia captures a primitive phase in the historic interactions between culture and nature. Chthonia represents the unlimited, deep, wet, dark, irrational, yet generative and creative side of the ground; it represents its vibrant and vital dimension. In contrast, Gaia represents the limited light and rational side of Earth. Chthonia transforms, through the act of veiling, into Gaia; whilst these appear to be two contrasting concepts, they are deeply connected. The significance of this myth lies in the process of transformation. A part of Chthonia, an uncontrolled, uncanny, irrational, and inhospitable space, is transformed into Gaia, which becomes a platform, place, and territory for human dwelling. Despite the considerable and continuous effort to transform the dark side of the Earth, its supposed disappearance represents one of the greatest human illusions. Underneath the platform, Chthonia steadily interferes with Gaia. The disappearance of the dark side of the Earth represents one of the greatest human il-
lusions. Underneath the platform, Chthonia steadily interferes with Gaia. Sometimes their mutual interference has an immediate effect, and other times it is less synchronized. However, connections between the two sides always exist, even when we cannot perceive them. The awareness of this forgotten connection between the two sides - nature transformed by human action and nature as soil - underlies one of the foremost contemporary questions of ecology.

As a testament to the symbolic significance of Chthonia’s myth, transformations of the ground have continuously been influenced by religious and cultural beliefs, which have shaped our understanding of nature since antiquity. According to Joseph Rykwert, in ancient Rome, tracing a border to define a territory meant making a furrow in the ground.\(^6^0\) Roman settlements were founded on such furrows, representing a sacred act that defined the edge of a settlement or city as a space distinct from the countryside. Since this separation was considered a violation of nature, a ritual gesture was needed to reconcile the two opposing spaces. Marcel Poëte also highlights how a continuity in the combination of ground (nature) and human transformation (culture) has always existed, supporting agricultural activities and the building of early human dwellings. Gaia is the stratified result:

“(…) first the virgin soil, then its transformation into the urban ground where the houses are lined up and intermingle with the greenery of the gardens, and finally, as a last stage, the transformation into the teeming streets of the contemporary city, where only the celestial vault recalls eternity.”\(^6^1\)
In modernity, such rituals are no longer deemed necessary in order to sanctify these actions that violate the grounds of nature. Interventions and cultural transformations have come to signify human’s unlimited power over nature, which is conceived as their rightful space to conquer. Tafuri’s essay “Reason’s Adventures: Naturalism and the City in the Century of the Enlightenment” and his analysis of Marc-Antoine Laugier’s architectural theory provides me with a framework for interpreting Latour’s paradox of modernity considering the development of the city. 62

In The Theory of Architecture, Laugier redefines the main principles of architecture through the concept of the primitive hut. He subsequently extends this redescription through the metaphor of the forest, to describe the principles on which a new idea of the city can be based. The hut becomes an architectural archetype for all kinds of buildings, and the forest metaphorically represents its urban counterpart. Nature is conceived in term of its rational laws, to which human beings and their corresponding artefacts also belong.

Philippe Descola explains such a shift away from previous understandings of the world, associating this with the ontological category of naturalism, as it became popular in the beginning of the 17th century across the West. Different to an ontological category that operated by analogies, and merged humans with non-humans and objects because of their physical continuity within an endless space, this shift separated humans based on the intellectual and linguistic abilities of the individual, overlooking and prevaricating different
cultures and entities: “the universal laws of matter and of life providing naturalism with a paradigm for conceptualizing the place and role of the diversity of the cultural expressions.”\textsuperscript{63}

Similarly, architecture and the city in their essential constructive logic were rationally interpreted by naturalism as natural processes. A conception of nature’s purity and universality ensured the validity and truth of any human transformations of the landscape, even as these became increasingly and explicitly influenced by geopolitical capitalist interests. Through a concept of nature, represented in the form of the forest, a new design process was guaranteed. Laugier’s theory reconciles, according to Tafuri, the different urban forces which were increasing the loss of form of the city:

“On the one hand, such an enterprise involves a sublimation of physiocratic theories: the city is no longer seen as a structure that, by means of its own accumulatory mechanisms, determines, and transforms the processes of the exploitation of the soil and agricultural production. Inasmuch as reduction is a natural process, ahistorical because universal, the city is freed of any considerations of a structural nature.

(…)

It is indicative that the urban theorists did not make this contradiction evident, but rather covered it up, or better, endeavored to resolve it by relegating the city to great sea of nature.”\textsuperscript{64}

Additionally, nature, through new ideas related to the picturesque aesthetic and its breakdown of a single perspectival point of view, became the main figurative reference for managing variety and fragmentation within urban projects: “Order and chaos, regularity and irregularity, organic structure and lack of organic structure.”\textsuperscript{65}
In these terms, Laugier’s urban theory expresses an attempt to find an impossible synthesis between rational laws and the uncontrollable aspects of reality, especially within the city. As Tafuri asserts, a crisis in urban and architectural management is concealed within this attempt. Applying Latour’s words, this conflict can be seen as the beginning of the modern paradox in the theory of the city’s development and the idea of land transformation.

There is more to consider, however. In a short sentence of the same essay, Tafuri describes this period as a transition from “Arcadian Naturalism” to “Enlightenment Naturalism.” While the latter is well explained by Tafuri’s analysis of Laugier and the implications of his theory on the city’s development in the following centuries, the Italian historian barely examines “Arcadian Naturalism,” its theoretical origins and potential impact on theories of the city. On the contrary, since Arcadian naturalism predates the modern paradox, it could establish a precise timeframe for the research and provide a method to observe historical facts in architectural theory and practice.

Research method: the Arcadian discourse

This timeframe direction becomes even more compelling when one considers Foucault’s investigation into the epistemological aspects of this period. In The Order of
Things, he explains the *episteme*\(^{67}\) that characterised this period, which can be seen as Arcadian following Tafuri’s definition, before discontinuity with the Classical Age occurred in the middle of the 17th century.\(^{68}\) According to Foucault, this *episteme* was characterized by the system of resemblances, which implied a general framework for knowledge without distinctions between theoretical or empirical subjects. It permeated art’s representation, exegesis, the interpretation of texts, the description of natural realms, and, by extension, even architecture.\(^{69}\)

The system of resemblances regulated the “prose of the world”\(^{70}\) through four categories: the *convenientia*, which denotes “a resemblance of the place, the site upon which nature has place two things, and thus a similitude of proprieties. (…) [As for instance] body and soul for instance are doubly convenient;”\(^{71}\) the *aemulatio*, which is similar to the first, but is free “from the laws of space;”\(^{72}\) the analogy, which treats the “more subtle of resembles relations;”\(^{73}\) the sympathy that “plays through the depth of the universe in a free state.”\(^{74}\) In addition, the system of resemblances “is founded upon the unearthing of and decipherment of these signatures. (…) The system of signatures reverses the relationship between visible and invisible. Resemblance was the invisible form of that which, from the depths of the world, made things visible; but so that this form may be brought out into the light in its turn, there must be a visible figure [signature] that will draw it out from its profound invisibility.”\(^{75}\) Signatures have a symbolic function to reveal the invisible network which underlies the
Foucault’s explanation of the transition from natural observations to the birth of natural history in the 17th century, which was governed by the *episteme* of representation characterised by order and distinction between identities and differences, provides a better understanding of how the system of resemblances functioned:

“Until the time of Aldrovandi, History was the inextricable and completely unitary fabric of all that was visible of things and of the signs that had been discovered or lodged in them: to write the history of a plant or an animal was as much a matter of describing its elements or organs as of describing the resemblances that could be found in it, the virtues that it was thought to possess, the legends and stories with which it had been involved, its place in heraldry, the medicinals that were concocted from its sub stance, the foods it provided, what the ancients recorded of it, and what travellers might have said of it. The history of a living being was that being itself, within the whole semantic network that connected it to the world. (…) And this was not because science was hesitating between a rational vocation and the vast weight of naïve tradition, but for the much more precise and much more constraining reason that signs were then part of things themselves, whereas in the seventeenth century they become modes of representation. (…) None of this was omitted by Aldrovandi, and he gives us a great deal more besides. (…) The whole of animal semantics has disappeared, like a dead and useless limb. The words that had been interwoven in the very being of the beast have been unravelled and removed: and the living being, in its anatomy, its form, its habits, its birth and death, appears as though stripped naked. Natural history finds its locus in the gap that is now opened up between things and words - a silent gap, pure of all verbal sedimentation, and yet articulated according to the elements of representation, those same elements that can now without let or hindrance be named.”

The example of Aldrovandi clarifies how the *episteme* of resemblances was made up of an extensive network of connections and incorporated a variety of dimensions of knowledge, which embraced broader semantic realms. In this
sense, similarities can be drawn, in terms of symbolic components and deep connections between various subjects, with the writings of contemporary thinkers, such as Graham Harman and Timothy Morton. They have written about symbolic and metaphorical language and the immaterial components of objects as a matter of understanding, centring on a non-human perspective on contemporary ecological discourse.79

Tsing has also remarked on how this can be achieved by transcending the disciplinary boundaries, allowing science and art to contribute to a new art in the description of reality.80 Before this, the ecological discourse was unravelled by Felix Guattari on multiple levels, inviting us to do so by applying a “logic of intensities,” a method of creative assemblage, that does not deal exclusively with “human subjects constituted as totalized bodies, but also [with] psychoanalytic partial objects, (…), institutional objects, faces and landscapes, etc.”81 Interestingly, Guattari explains this logic by looking at the intrinsic ability of art and literature to create messages and connections through “redundancies of expression and content.”82 Their poetic and symbolic language allow us to understand and unlock an “eco-logic” which underlies the network of individual and collective relations.83 Additionally, in line with Foucault’s approach and investigation of epistemes, Donald Worster’s study of the history of ecological ideas in the natural sciences provides a further crucial suggestion for unfolding the term Arcadian, as used by Tafuri, toward indicating a tool for unearthing ecological approaches ante litteram through history.84
In 1977, Worster, an American historian who specialised in environmental history, published *Nature’s economy: A history of Ecological ideas* following a period of increased concern for the environment, as first raised by the American environmental movement of the early 1960s. According to Worster, the study of environmental history aims to deepen “how human beings have been affected by their natural environment through the time, and conversely, how they affected the environment and with what results.” This takes place on three levels: by the “understanding of the nature itself; as organized and functioning in the past” by bringing in “the socioeconomic real as it interacts with the environment,” and lastly, by a “more intangible and uniquely human type of encounter – the purely mental or intellectual, in which perception, ethics, laws, myths, and other structure of meaning become part of an individual’s or a group’s dialogue with nature.”

On the basis of this third and final level, Worster extends in his first book an interpretation of nature and its resultant relationship with humanity, commonly defined by the natural sciences, which includes contributions from other disciplines, such literature, poetry, and philosophy. As a result, he puts forward an interesting theory by dividing these ideas on nature into two categories: one defined as Arcadian discourse and another as Imperial. The latter represents “man’s dominance over nature, (...) through the exercise of reason and by hard work,” as the “dominant figure over nature and all other organisms as once enjoyed in the Garden of Eden.”

By using the term imperial, Worster captures the phil-
osophical perspective of this category. He certainly refers to the Linnaean classificatory system of nature, which contributed to the description of a large number of species of animals and plants by recording their morphological characteristics. Since most of these specimens were obtained from overseas in the conquests of European colonies, this term reflects the historical circumstance under which Linnaeus’ system was developed. Worster highlights Linnaeus’s inability to understand the interdependence between living beings and their environments, which served as a cultural justification for legitimising his anthropocentric perspective along with the histories of Western colonisation.

In contrast, Gilbert White’s contribution is used by Worster as a “point of origin, representative if not seminal for the modern study of ecology” as well as being the most representative of the Arcadian discourse, due to “an inner sense of harmony between men and nature through an outer physical reconciliation. (...) by restoring to scientific inquiry some of the warmth, breadth, and piety.” According to Worster, White’s contribution represents a historical turning point around the 18th century, where the “two roads – the Arcadian and the Imperial approach - of ecology studies diverged.”

The second Imperial approach, which “stripped from Nature all spiritual qualities and rigidly distanced it from human feelings, promoting a view of creation as a mechanical contrivance” came to prevail over the first. With White’s contribution, Worster promotes an understanding of nature not just as an external realm whose constituents are observed
from the outside, but rather as an interconnected realm where the dominant hierarchy of the human perspective is disrupted. As a result, Worster emphasises the relevance of a broader spectrum of connotations pertaining to the relational nature and quality of human-nonhuman exchange.

According to Richard Mabey, who writes a comprehensive bibliography of White’s work, this view only took shape recently with regards to the ideas of the poet Geoffrey Grigson. The latter was the first to view White in this particular perspective, explaining in the introduction of *The English Year: From Diaries and Letters* how White represented a writer of “something seen, something sensed, something or other felt and enjoyed, in the country around them, day after day, month after month, through the year.”

Since its publication in 1789, *The Natural History of Selborne* by Gilbert White has been regarded as a written testimony to the idyllic English rural landscape, though this perhaps conceals its true and innovative value. The book’s early success was predominantly due to the ability of his interpretation to maintain an idyllic image, celebrating the values of the British countryside, in distinction to the disturbances stirred by the agricultural revolution at the time. His most relevant contribution was to provide a new perspective on natural science, in contrast to Linnaeus and John Ray. While White regarded these figures as valuable sources for identifying and comparing animals, birds, and plants, he was also able to expand beyond their taxonomic approach, in considering the activities of living beings in terms of their interaction with
environments. This gestures to an understanding that is overlooked by Linnaeus and Ray.

By drawing on his daily observations, compiled in his naturalist calendar, he was able to not only describe elements of the natural realm in distinction, but further visualise their numerous interrelationships. Due to their complexity, such interrelationships cannot so easily be perceived; White more broadly senses these connections, particularly in his observation of birds, which he was especially passionate about.97 (FIG.6)

A focus on the relatively small area of Selborne is a most significant element which allowed White to discover far-reaching natural mechanisms, which at the same time were uniquely situated in his personal experiences. This approach is evident throughout the narrative of White’s work; from the very beginning, he invites readers to immerse in Selborne’s landscape by illustrating all the natural and artificial elements that compose it. For instance, in portraying his beloved village, embedding it in the environment, White places much emphasis on the relationship between the mineral composition of the soil and its effect on agricultural cultivations, plants, and animals. However, a more peculiar approach becomes evident in his later description of the arrival of swallows. In his attempts to hypothesise their migration patterns, White’s contribution works through a particular and rare affection in relation to the natural world, which is infused with “secret delight, and some amount of mortification.”98 As much as he is delighted by their “punctuality,” he also sym-
pathises with their vulnerability and uncertain journey ahead. In recognising “the richness and rhythm of their own,” White accords the birds an equal and full dignity, even though they are part of a human-dominated system. 99

In this sense, one of the most effective parts of White’s text appears in his transcription of the poem - THE NATURALIST’S SUMMER-EVENING WALK – across letters XXIII and XXIV, which are addressed to his friend, Pennant.100 (FIG. 7)

“THE NATURALIST’S SUMMER-EVENING WALK
…equidem credo, quia sit divinitus illis Ingenium…”101

When day declining sheds a milder gleam, What time the may-fly haunts the pool or stream; When the still owl skims round the grassy mead, What time the timorous hare limps forth to feed; Then be the time to steal adown the vale, And listen to the vagrant cuckoo’s tale, To hear the clamorous curlew call his mate, Or the soft quail his tender pain relate; To see the swallow sweep the dark’ning plain Belated, to support her infant train; To mark the swift in rapid giddy ring Dash round the steeple, unsubdu’d of wing: Amusive birds!—say where your hid retreat When the frost rages and the tempests beat; Whence your return, by such nice instinct led,
When spring, soft season, lifts her bloomy head?
Such baffled searches mock man’s prying pride,
The GOD of NATURE is your secret guide!
While deep’ning shades obscure the face of day
To yonder bench, leaf-shelter’d, let us stray,
Till blended objects fail the swimming sight,
And all the fading landscape sinks in night;
To hear the drowsy dor come brushing by
With buzzing wing, or the shrill cricket cry;
To see the feeding bat glance through the wood;
To catch the distant falling of the flood;
While o’er the cliff th’ awakened churn-owl hung
Through the still gloom protracts his chattering song;
While high in air, and pois’d upon his wings,
Unseen, the soft enamour’d woodlark sings:
These, NATURE’S works, the curious mind employ,
Inspire a soothing melancholy joy:
As fancy warms, a pleasing kind of pain
Steals o’er the cheek, and thrills the creeping vein!
Each rural sight, each sound, each smell combine;
The tinkling sheep-bell, or the breath of kine;
The new-mown hay that scents the swelling breeze,
Or cottage-chimney smoking through the trees.
The chilling night-dews fall: away, retire;
For see, the glow-worm lights her amorous fire!
Thus, ere night’s veil had half obscured the sky,
Th’ impatient damsel hung her lamp on high:
True to the signal, by love’s meteor led,
Leander hasten’d to his Hero’s bed.”

In this opening quotation, White enounces his model, Virgil, as one of the foremost representatives of the Arcadian tradition. White shares Virgil’s eyes. In the most part, White’s poem mirrors Virgil’s content, extensively describing how animals behave at dusk and at the arrival of the rain, “when the still owl skims round the grassy mead” or “the timorous hare limps forth to feed.” Yet, he also emulates Virgil’s poetic approach by expressing affection towards the animals encountered throughout his narrative, using qualitative adjectives like “soft quail” and “timorous hare.” There are, however, three short paragraphs that reveal a novelty that contrast the Latin poems.

As he observes the swallows, White fully assumes the role of the naturalist, attempting to understand their seasonal movements and investigate the mechanism of their migration, which however remains unknown. There seems to be a change in tone here, shifting from being affectionate towards a more investigative register. Despite this, White does address one swallow using the second person “you,” conveying a sense of friendship and equal dialogue. This idea of closeness and equality is founded on one of the founding principles of the Arcadian discourse.

The expression, “mock man’s prying pride,” suggests White’s extremely harsh judgment of human behaviour which, especially in its tone, also appears consistent with his religious beliefs. Despite his harsh words toward humans, he
FIG. 6 Original page of Gilbert White’s daily journal, 1813.
includes a few human objects in the picture of Selborne’s rural landscape that his narrative draws. This includes features such as benches, a “cottage-chimney smoking through the trees,” and a lamp hanging from “the impatient damsel.” Fragments of Selborne, its sights, sounds, and smells, are neither distant nor dangerous, on the contrary, they slowly become a part of the overall environment.

While White perceived a general danger concerning human behaviour, he was unable to predict the extent of upcoming transformations that would affect the countryside of Britain. Despite his lack of foresight, his vision of an untouched landscape allowed him to grasp the complexity of interrelationships and appreciate its aspects from multiple perspectives. Thus, White’s narrative approach is not only unconventional due to the nature of his naturalist text, structured as a collection of letters, but also thanks to his inclusion of such a significant poem, which fully reflects the unique character of the Arcadian discourse. Thus, White facilitates a blending of scientific and poetic elements, extending topological categories by considering how they interrelate, and sensing across the tropes of the Arcadian discourse.

Moreover, Worster’s interpretation of White and his connection to the Arcadian discourse can be strengthened by turning to Cecil Emden’s reading of *Gilbert White in his Village*. The book, published in 1956, was inspired during research conducted at Oriel College, which Emden attended two centuries after White. Instead of concentrating on White’s role as a naturalist pioneer, Emden emphasises the interac-
tions within the Selborne community, and its close connections to the surrounding environment, highlighting the sense of ‘we’ of those who inhabited that place. 104

He retraces how these relationships were established, demonstrating the added value that White offered his community by maintaining their interests in environments, animals, plants, and human interactions. This effect worked both ways, as the community supported White’s research in various ways. According to Emden, the success of White’s work relies on his engagement with the mutual knowledge of Selborne’s inhabitants.105

White played a crucial role by interacting with farmers and breeders, using their “time immemorial” experience to deepen his own knowledge and share his personal discoveries. Thanks to his scientific background, he often suggested practical agricultural improvements which also benefited their work. This included the maintenance of soil, the better use of seeds and grass, and the promotion of new plants, such as potatoes.

According to Ted Dadswell, White was likely aware of the most advanced agricultural practices of his time, which were promoted by Jethro Tull and Robert Bakewell.106 On the contrary, it can be seen how White always managed to strike a balance between both worlds: he was fascinated by discoveries, but also respectful of the functions behind long-standing traditional knowledge. Nevertheless, as Emden argues, White demonstrates a philanthropic attitude that extended beyond science; he actively supported the community of Selborne
regarding their health issues, such as caring for his unwell neighbours and assisting during epidemics. He even went to the extent of repairing pathways, building alcoves for the community, and planting new trees in order to benefit the village environment. It is therefore not surprising that he also had numerous aids in his work as a naturalist. Often neighbours or farmers would bring him animals (if they did not kill them) specifically for his research, or they would tell him of natural events or other facts that White, once verified, would write down in his journal.

Through the example of White, it becomes clear that the Arcadian discourse can transcend the pastoral literary genres that we usually refer to. Instead, it can be viewed as a receptacle where human and non-human characters, stories, vicissitudes, and events are interwoven; where boundaries between scales are blurred on both a geographical and a historical scale; where scientific and poetic perspectives are complementary; where the concept of nature is revealed in all its multiple intertwined and inseparable meanings as inner and external nature;¹⁰⁷ and where, as I will demonstrate further by analysing Virgil’s poetry, three levels - the physical, political and symbolic – come to coexist, echoing Guattari’s reflections.¹⁰⁸

*Research key argument*
The comparison between Latour’s and Tafuri’s historical explorations regarding how nature and culture have evolved within philosophical and architectural disciplines highlights two main components that are centred in this research: first, human-land interactions, including ideas and practices related to them in Italian territory; and second, a relevant timeframe for these transformations between the 15th and 17th centuries. Both the object (human-land interactions) and the time frame, as further evidenced by Foucault’s description of the *episteme* of resemblance, should be fruitful concepts to unearth ideas and practices, which have prepared the ground for contemporary ecological discourse, especially in the context of relationships between nature and culture.

To conclude, Donald Worster’s investigation clarifies how the Arcadian discourse can be viewed as a lens/method for exploring ecological practices and ideas *ante litteram*, before the term ecology was coined. This includes broader kinds of knowledge that embrace various registers in line with Foucault’s archaeological approach and his investigation of the *episteme* of resemblance. Thus, the initial hypothesis can be further strengthened and turned into the key research argument. By examining the history of ideas and practices through the lens of the Arcadian discourse, ecological approaches *ante-litteram* can be unearthed and used as a basis for addressing the contemporary modification of the nature/culture relationship that affects cities, territories, and their future imaginaries. This is the point where the historical investigation of the thesis can begin, leaving the conclusion to re-knot the con-
nections with contemporary ecological theories and authors.

*Research trajectories and thesis’ plan.*

Starting around the 15th century, when the Arcadian genre was revived in Italian culture, I will investigate texts spanning various dimensions of knowledge, including literature, architecture, mechanics, water management, and visual materials, such as maps, to investigate Arcadian discourse.

However, any journey requires appropriate equipment before departure. For this reason, the first chapter deals with a reading of Virgil’s *Eclogues* and *Georgics*, which serves as a foundation for understanding the components of the Arcadian discourse. It is not the aura of harmony that has often accompanied this genre that interests me, but rather the three ecological dimensions that Virgil’s works reveal: the physical, political, and symbolic. Through these three levels of understanding, I try to discern the ecological dimension of documents that aren’t literary in nature, extending the tropes of Arcadia to consider nonfiction texts and artefacts. Additionally, clarifying these components is essential for selecting texts that reflect similar interests and concerns throughout history. Whilst the Arcadian genre has often been interpreted sceptically and reductively by scholars in terms of its aestheticization and simplification of nature, such readings fail to acknowledge Virgil’s original model and purpose.
**Theogenius**, a brief text with Arcadian inflections written by Leon Battista Alberti around 1440, provides a fruitful example which allows me to establish a bridge between literature and architecture. The work vividly highlights Alberti’s concept of nature as symmetrical; it is conceived as a general model which follows universal laws but is also sensed in terms of the inner nature of human beings. Using this second lens, Alberti provides a few precursory and powerful thoughts on how humans affect the environment. If Virgil provides a foundational model, Alberti extends the content of *Eclogues* and *Georgic* with ethical concerns and reflections on appropriate civic behaviours, imbuing the Arcadian with a moral imperative. It is in this direction that the second chapter traces a linear trajectory towards Alberti’s later text, *On the Art of Building in Ten Books*. The chapter aims to embrace Alberti’s ethics regarding the inner nature of human beings, as outlined in *Theogenius*, through to its total realisation in *On the Art of Building in Ten Books*, where architecture is theorised as a form of medicine for healing society.

In these terms, Alberti’s contribution is set in a transitional period, which already contains the preconditions of the modern paradox as defined by Latour. The comparison between two apparently similar statements by Alberti and Barbaro suggests the formation of two directions that can be traced through history: Alberti’s conception of nature echoes Arcadian components whereas Barbaro outlines an idea of nature as an object to be conquered, opening onto imperialist discourses. This comparison provides an opportunity to move
from the world of abstract ideas to the concrete matter of fact, understanding how they affected human transformations of the land. It is here that my journey arrives at Venice.

The map, drawn by Francesco Rosselli in 1492, provides a lens through which to investigate Venice and its territory. By representing water with yellow, the land becomes “the ground,” and the water becomes “the figure.” This inversion may suggest looking at the hydrogeological complexity of the Italian territory and its fragility as a research direction. In this sense, Venice stands as one of the most prominent witnesses to early environmental instabilities, from the 15th century onwards, due to its intertidal condition. (FIG. 7)

Therefore, the fourth chapter deals with peculiar events that characterize the history of the Serenissima. Its lagoon was affected by processes of landfill from the beginning of the 15th century, whilst its new body on Terraferma was involved in extensive land reclamation campaigns, under the pressure of new economic models that surpassed maritime trade.\(^{112}\) Therefore, deforestation began to harm the mountains surrounding Venice, alongside other territories of the Serene Republic, such as Dalmatia, where Mount Velebit is the prime example.\(^{113}\) Despite their location across different geographical regions, these three phenomena, impacting the lagoon, mainland, and mountainsides are revealed to be deeply intertwined, illustrating the functioning of an ecological system.

Beyond describing the historical facts, this chapter highlights how Venetian water management and other institutions worked. They were crucial to maintaining the fragile
balance of the Venetian ecosystem amid the mutable political, economic, social, and environmental circumstances. The texts of Cristoforo Sabbadino, a *proto* of the Republic, and his correspondence with Alvise Cornaro, a Paduan landowner on *Terraferma*, serve to outline the laws, procedures, and various practices, as well as philosophical concepts, that led to an understanding of how to care for the lagoon and its surrounding territory. Ruzante’s works provide a deeper insight into the places where these interventions occurred and the people who lived there. Virgil’s shepherds return to the scene as peasants who inhabit the Venetian *Terraferma*, providing a new dimension to the Arcadian discourse, Arcadia Rusticana.}

In continuity with the previous chapter, the fifth investigates the evolution of Italian hydraulic science as a distinct discipline, comparing treatises by Benedetto Castelli and Giovan Battista Aleotti. Moreover, I look to Cristoforo Sorte’s maps and diagrams of machines, which relate to hydraulic studies. The bifurcation between Arcadian and Imperial discourse becomes even more evident here. Aleotti’s words and Sorte’s maps still embody a point of view that embraces plurality and a collective dimension of society, appearing as some of the last fragments of the Arcadian discourse. These are then swept away by “the implicit philosophical program of modernity, endowed in its traditional version with three foundations valid as a whole as a political and social device, as well as a scientific one: certainty, rational formality, and the desire to start over which within a single vision are valid not only for the Tabula Rasa.”
In light of this broader perspective, Arcadian discourse does not completely disappear; the conclusions of this thesis suggest that some contemporary authors can still be read through this lens and suggest a summary of the research findings and a reflection on the thesis’ argument.
FIG. 7 Map of Italy by Francesco Rosselli, 1492.
Endnotes

1 In case of rising sea levels, an acoustic warning system has been in place since after Second World War. Inherited from aircraft alarms, it was later improved with a more sophisticated digital system.

2 Data reported by Isprambiente. This is a national research institution which is in charge of monitoring the health of the environment. https://www.isprambiente.gov.it/it/archivio/notizie-e-novita-normative/notizie-ispr/2020/06/venezia-2019-anno-record-di-eventi-estremi-focus-sullacqua-alta-del-12-novembre.

3 The reader will become familiar with the names of the Adige, Brenta, Piave, Arno, and Tiber rivers, which have represented the menacing and well-known protagonists of the country’s flooded history.

4 This thesis examines how some historical civic attitudes and ethical approaches echo this sense of care.


6 “The use of Architecture is to underline and bring out problems and not solve them. From the designer point of view, this role of architecture is very interesting. We can see the reality, that includes human beings, nature, thoughts etc, and describe it, map it. We can describe the reality, and the causes and effects related to it, looking at future and focusing on just one point. At the end, we can invent the future, through an operative criticism, and make some proposal, radical and not. Is there any similar research currently? Are there any radical ideas are they useful?” Gabriele Mastrigli, ed. Superstudio: opere: 1966-1978 Superstudio (Macerata: Quolibet, 2016), 238.

7 On the MoSe website, all aspects of the project are presented: https://www.mosevenezia.eu

8 The barene maintain the lagoon, retaining sediments, filtering water, and preventing soil erosion, whilst minimising flooding and high tides due to differential heights. They protect specific vegetation consisting of halophilic plants (Limonio/marsh-rosemary, salicornia/glasswort), which become habitats for birds to nest, and for mollusks, crustaceans, and other sea creatures at low tide.

9 The section at the end of the thesis contains further explanations of each drawing and the utilised sources from which they have been elaborated.
12 The reader will discover that I do not use this metaphor arbitrarily. In the 16th century, Cristoforo Sabbadino described the lagoon as a delicate vital organ, indicating the complex understanding of the Lagoon’s function.
16 Even though this species was allochthonous, its fishing was legalised after years of illegal cultivation, which damaged the lagoon’s ecosystem. This led to the construction of fish farms, which reduced the amount of “breathing” surfaces in the lagoon and transformed the salt marshes into islands.
17 According to Lorenzo Bonometto, not only have the provisions proposed by governmental laws been disregarded, but also what has been regenerated or rebuilt, even artificially, has often been built in places where salt marshes did not exist and with morphological criteria that are unsatisfactory with respect to the pre-existing system, such as through the application of different height levels, surface, and soil texture.
20 “In other words, the canal network was not a fixed feature of the environment as a river might have been in another place. Many old canals were drained eventually, while new ones were created by dredging. The entire system was continually reshaped.” Elisabeth Crouzet-Pavan, “Toward an ecological understanding of the myth of Venice,” in *Venice Reconsidered: The History and Civilization of an Italian City-State, 1297–1797* (Baltimore: Johns Hopkins University Press, 2000), 46.
21 According to Dennis Romano, the mosaic of Saint Mark symbolized God’s protection of Venice. As well as being a pilgrimage stop on the way to the Holy Land, the mosaic also represented the city’s strength derived from its unassailable spiritual foundation, which served as a warning to
those who would have sought to conquer it. Furthermore, it served a civic purpose. Saint Mark’s relics signified a period of “peacemaking and civic concord” and reminded Venetian citizens of the privilege and significance of hosting them. Therefore, the mosaic served as a warning to the Venetian community to maintain a strong bond and collaborate toward achieving the ideal of concord. This ideal was also embodied in public and private laws, chronicles, and corporate statutes, which contributed to its strengthening and mythologizing.


22 Crouzet-Pavan provides a beautiful description of the peculiarities of Venice’s construction: “The indispensable first step in expanding the city was therefore to create land on which to build. Forays were made into the lagoon and interior ponds; new territory was conquered by dredging, draining, driving pilings, making various other improvements, and linking isolated bits of lands. These activities coincided with continuing settlement. Over the years the wave of improvements swelled and became a formidable tide; settlement sites proliferated, and new islands emerged. As for the network of canals, if one excepts the Grand Canal, which defined the overall shape of the city, and the broad channel of the Giudecca, canals were no more stable a part of the landscape than was land. In other words, the canal network was not a fixed feature of the environment as a river might have been in another place. Many old canals were drained eventually, while new ones were created by dredging. The entire system was continually reshaped.” Crouzet-Pavan, “Toward an ecological understanding of the myth of Venice,” 45-46.

23 However, Dennis Romano emphasizes that this did not mean that Venice’s society was free of social and political conflicts. Rather, despite periods of significant instability and conflict, such as political crises and plagues, Venetian society remained significantly more stable and compact in comparison to other Italian cities during the early Renaissance. To explain the reasons for this peculiar stability, Romano refers to numerous scholars, including Brian Pullan and Frederic Chapin Lane, who have attributed this to different factors, including Venice’s geographical location. Firstly, the lagoon served as a defensive barrier that physically separated it from the Terraferma and prevented conflicts with other feudal powers. Secondly, Venice’s topography also contributed to its stability. By dividing the city into parishes through canals, the structure of the city reduced conflicts and riots, and helped maintain the internal unity of each parish and its inhabitants. Furthermore, Venetian society structures were not rigidly hierarchical but more permeable to new citizens and provided civic roles
for non-noble citizens within religious confraternities and guilds, thereby reducing conflicts between different members of society. See Romano, “Community and Conflict in Early Renaissance Venice,” in *Patricians and Popolani*, 18-39.

24 In this regards, Romano’s contribution is relevant in showing how the causes of this stability were more subtle and intimately rooted “in a myriad of intersecting networks that did not follow narrow class or factional lines. Associations were not determined by any one factor such as wealth or legal status. Instead, they tended to be freewheeling. The ties between patricians and popolani and among popolani were complex and multifaceted, and this militated against an easy division of society into nobles and commoners. (...) the greatest tension in early Renaissance Venetian society was not between patricians and popolani but rather between wealthy popolani who, through a variety of personal ties, associated with patricians and the popolo minuto, little people, who were isolated from the mainstream institutions of Venetian life and who therefore had to create their own social worlds.” Ibid., 36.

25 (Translated by the author) Nelli E. Vanzan Marchini, *Venezia civiltà anfibia* (Verona: Cierre edizioni, 2009), 120.

26 “Up to this point, responsibility for keeping canals, streets, and other facilities in good repair had lain with the parishes and especially with the leading parochial families. But as the parishes lost their autonomous character and the involvement of great families with particular communities declined, questions of jurisdiction, responsibility, and ownership arose. In order to resolve these and similar questions, the government intervened. It divided the city for purposes of administration into a number of geographically defined units and assigned officials to them. The government was then able to treat these units as corporate bodies and assign them responsibility for maintenance of public facilities.” Romano, *Patricians and Popolani*, 52. See also chapter 4 of this thesis.-

27 Crouzet-Pavan, “Toward an ecological understanding of the myth of Venice,” 49.

28 Ibid., 50.

29 “The new discourse of danger, which coexisted with this older rhetoric, marked a crucial change in both the political history and the mythology of Venice. It helped to desacralize the Venetian mentality by presenting the state, its magistrates, and their courses of action as capable of preserving the city and ensuring the survival of its inhabitants.” Ibid., 56.

30 An extensive historical picture of these changes and tensions is provided by Manfredo Tafuri in *Venice and the Renaissance* (London: MIT Press, 1989), *Renovatio Urbis, Venezia nell’età di Andrea Gritti, 1523-1538* (Rome: Officina Edizioni, 1984) and *Armonia e i conflitti: la chiesa di San...*
Francesco della Vigna nella Venezia del’ 500 (Turin: Einaudi, 1983). See also chapters three and four of this thesis.
31 Tafuri, Venice and the Renaissance, x.
32 Prudentia means caution in Latin.
33 Tafuri, Venice and the Renaissance, 11.
34 Crouzet-Pavan, “Toward an ecological understanding of the myth of Venice,” 51.
35 Guattari, The Three Ecologies, 28.
36 Crouzet-Pavan, “Toward an ecological understanding of the myth of Venice,” 51.
38 As explained by Anna Tsing, “for most of the 20th century, ecologists focused on the ecological communities, imagined as stable configurations seeking equilibrium.”
Tsing, “Aura’s Openings: Unintentional design in the Anthropocene,” 47.
40 Tsing, “Aura’s Openings: Unintentional design in the Anthropocene,” 47.
44 Foucault, The Order of Things, xxiii.
45 Foucault defines the concept of the episteme of Western culture as what characterises every historical period “by a fundamental paradigm (understood as a particular standard), which delineates the cultural production of specific type of knowledge.” Fontana-Giusti, Foucault for Architects, 22. Foucault also identifies two relevant discontinuities in history: the Classical Age began in the middle of the 17 th century, and the second one at the beginning of the 19 th century, which marked the beginning of the Modern Age.
See Foucault, The Order of Things, xxiv-xxv.
46 Ibid., xxiii-xxiv.
48 In The Three Ecologies, Guattari illustrates how ecological discourse can be understood by three registers: the environmental, social relations, and human subjectivity. Guattari, The Three Ecologies, 28.
49 In this sense, in the last part of her paper “Catachresis for the Anthropocene,” Tsing suggests: “by respecting genres differences across disciplinary
traditions, we can use them to recreate new genre of translation and play (...) “re-learn the art of the description” involving “an interdisciplinary revival of descriptive methods” across disciplines anthropology, history and its turn to environmental narration, biology, science studies.


50 “Thus, between the already ‘encoded’ eye and reflexive knowledge there is a middle region which liberates order itself: it is here that it appears, according to the culture and the age in question, continuous and graduated or discontinuous and piecemeal, linked to space or constituted anew at each instant by the driving force of time, related to a series of variables or defined by separate systems of coherences, composed of resemblances which are either successive or corresponding, organized around increasing differences”.

Foucault, The Order of Things, xxiii.

51 “The first set of practices, by ‘translation’, creates mixtures between entirely new types of beings, hybrids of nature and culture. The second, by ‘purification’, creates two entirely distinct ontological zones: that of human beings on the one hand; that of nonhumans on the other. Without the first set, the practices of purification would be fruitless or pointless. Without the second, the work of translation would be slowed down, limited, or even ruled out. The first set corresponds to what I have called networks; the second to what I shall call the modern critical stance. (...) So long as we consider these two practices of translation and purification separately, we are truly modern - that is, we will subscribe to the critical project, even though that project is developed only through the proliferation of hybrids down below. As soon as we direct our attention simultaneously to the work of purification and the work of hybridization, we immediately stop being wholly modern, and our future begins to change.”


53 Latour, We Have Never Been Modern, 152.

54 Ibid., 157.

55 Ibid., 153.

56 Ibid., 153.

57 This investigation is mainly developed through chapter 5.


The concept of anthropomorphism is another term that recurs throughout this research text. Latour explains its meaning in the two paragraphs: “The expression ‘anthropomorphic’ considerably underestimates our humanity. We should be talking about morphism. Morphism is the place where tech-
nomorphisms, zoomorphisms, phusimorphisms, ideomorphisms, theomorphisms, sociomorphisms, psychomorphisms, all come together. Their alliances and their exchanges, taken together, are what define the anthropos.”


And he takes up this concept: “You might complain that this geohistorical account is marked by an excessive dose of anthropomorphism. I hope so! Certainly not in the old sense in which it would “project human values onto an inert world of mute objects” but, on the contrary, in the sense that it ‘gives humans a shape,’ or, as one can say in English, that it is beginning to morph humans into a more realistic image.”


61 (Translated by the author)


Marcel Poëte was a French historian and urban theorist, who lived between 1866-1950.


64 Tafuri, “Reason’s Adventures: Naturalism and the City in the Century of the Enlightenment,” 7-8.

65 Ibid., 21.

66 Ibid., 8.

67 See endnote 45 in this chapter for the definition of *episteme*.

68 This discontinuity is aligned both to the transition towards Enlightenment Naturalism as defined by Tafuri, and to the beginning of the modern paradox as defined by Latour.

69 It should be noted, however, that Foucault does not explicitly mention architecture in his investigation.

70 This is the title of the second chapter, where Foucault explains extensively the manifestation of this *episteme*:


71 Foucault, *The Order of Things*, 20.

72 Ibid, 23.
73 Ibid, 24.
74 Ibid, 24.
75 Ibid, 29-30.
76 Foucault explains the characteristics of this *episteme* in chapter three of *The Order of Things*.
77 Ulisse Aldrovandi (1522-1605) was an Italian naturalist, geologist, physicist, and ethnographer.
78 Foucault, *The Order of Things*, 140-141.
80 See endnote 49 in this chapter.
81 Guattari, *The Three Ecologies*, 44.
82 Ibid., 46.
83 Ibid., 46.
84 Donald Worster was born in 1941 in California, U.S.A.
87 “Environmental history is part of a revisionist effort to make the discipline far more inclusive in its narrative than it has traditionally been. Above all, it rejects the conventional assumption that human experience has been exempt from natural constrains, that people are separate and supernatural species, and the ecological consequence of their past deeds can be ignored. (...) The idea of an environmental history first appears in 1970, as conferences on the global predicament were taking place and popular environment movements were gathering momentum in several countries.” Worster, “Appendix: Doing Environmental History,” 291-293.
89 Linnaeus was a Swedish botanist (1703-1786) who pioneered the invention of the modern classification system for plants and animals, which is still used today.
Paul Lawrence Farber describes “Linnaeus concerned himself primarily with the naming and classifying of natural objects. His interest in these
activities reflected their importance to the study of natural history in Linnaeus’s time: Europeans each year encountered thousands of new species of animals and plants, plus numerous new rocks and minerals. (...) In the Systema naturae (1735), he outlined the general system that he believed would bring order to natural history, a task he considered critical. (...) The Systema naturae proposed a new system of classification for plants, animals, and minerals. The most original and influential section contained a sexual system of classification for plants.”

Linnaeus wrote in his opening remarks: “The first step in wisdom is to know the things themselves (...) This notion consists in having a true idea of the objects; objects are distinguished and known by classifying them methodically and giving them appropriate names. Therefore, classification and name-giving will be the foundation of our science.”


90 Gilbert White was born in Selborne in 1720 and died there in 1793. Gilbert White, The Natural History and Antiquities of Selborne (London: White and son, 1789).

91 Worster, Nature’s Economy, 5 and 17

92 Ibid., vii.

93 Ibid., 29.


96 John Ray was an English naturalist (1627-1705) who wrote a relevant book, Historia Plantarum, applying modern criteria of classification by looking at the similarities and differences of plants, not in terms of pre-conceived ideas. He was the first to use the term “species” for plants and animals.

97 Danniel Barrington designed the format of this journal with the practical purpose of collecting information, namely, to improve agricultural standards. White enhances the rigid grid format with information about the weather, the flowering of plants, the singing of birds, and other annual changes, as well as through his extensive observation notes in the right-hand side column. This last part has become the richest and most valuable source of White’s thought process, which is mostly reported in his book.


99 Ibid., ix.

100 Ibid., 66-67.
“Not, me thinks, that they have wisdom from on high, or from Fate a larger foreknowledge of things to be;”


This is an excerpt taken from a longer paragraph in *Georgics*, in which Virgil is captured by animals, particularly birds, which are able to detect even the subtlest changes in their surroundings.


104 “White’s attention was remarkably focused on this microcosm, the natural order of his little parish.”


105 Gilbert White wrote a letter to D. Barrington explaining the differences between sheep farming and the quality of their wool in different regions of Great Britain: “One thing is very remarkable as to the sheep: (…) If you talk with the shepherds on this subject, they will tell you that the case has been so from time immemorial: and smile at your simplicity if you ask them whether the situation of these two different breeds might not be reversed?”


106 Tull was an agronomist who invented advanced tools and methods, such as using a horse-drawn drill to sow seeds mechanically in rows rather than by hand. Additionally, Bakewell devised a method to select sheep and cattle for breeding and culling.


108 See endnote 48 and the first chapter of this thesis.

109 Interactions between humans and land include a wide range of activities: land transformations, reclamation, and repair. In this thesis, the term “land” refers to the concept of territory, including rivers, which become one of the subjects of my thesis.

110 In fact, the term ecology was introduced for the first time in 1866 by Ernst Haeckel.

111 Bruno Latour, *We Have Never Been Modern*, 11.

112 *Terraferma* means in Italian, mainland. In the case of Venice, it is the continental portion that surrounds the lagoon.

113 This subject has been extensively developed by Karl Richard Appuhn, in his book *A forest on the sea: environmental expertise in Renaissance Venice* (Baltimore: Johns Hopkins University Press, 2009), and Mauro

114 The *proto* was a hydraulic expert who supervised the health of the lagoon. He was a member of the political institution called the *Magistrato delle Acque*.


1. On Virgil and the Arcadian discourse.
“Nor less after rain may you foresee bright suns and cloudless skies, and know them by sure signs. For then the stars’ bright edge is seen undimmed, and the moon rises under no dept to her brothers’ rays, and no thin fleecy clouds pass over the sky. Not now do the halcyons, the pride of Thetis, spread their wings on the shore to catch the warm sun, nor do the uncleanly swine think of tossing straw bundles to pieces with their snouts. But the mists are prone to seek the valleys, and rest on the plain, and the owl, as she watches the sunset from some high peak, vainly plies her evening song. Nisus is seen aloft in the clear sky, and Scylla suffers for the crimson lock. Wherever she flees, cleaving the light air with her wings, lo! savage and ruthless, with loud whirr Nisus follows through the sky; where Nisus mounts skyward, she flees in haste, cleaving the light air with her wings. Then the rooks, with narrowed throat, thrice or four times repeat their soft cries, and oft in their high nests, joyous with some strange, unwonted delight, chatter to each other amid the leaves. Glad are they, the rains over,
to see once more their little brood and their sweet nests.

Not, methinks, that they have wisdom from on high,
or from Fate a larger foreknowledge of things to be;
but that when the weather and fitful vapours of the sky have
turned their course,
and Jove, wet with south winds, thickens what just now as rare,
and makes rare what now as thick, the phase of their minds change,
and their breasts now conceive impulses,
other than they felt when the wind was chasing the clouds.

Hence that chorus of the birds in the fields,
the gladness of the cattle, and the exulting cries of the rooks.”¹
As mentioned in the introduction, it is with this quote from Virgil that Gilbert White opens the poem “The Naturalist’s Summer Evening Walk.” This excerpt is from a longer passage in the first book of Virgil’s *Georgics* where, centuries before White, the Latin poet demonstrates a fascination with the ability of animals, particularly birds, to interact with their environment. Virgil recognises how birds detect even the slightest changes in their environment, such as the changing light between night and day, as well as sounds and weather signals. Virgil notices how, for example, the owl watches the sunset, and the Nisus enjoys the wide skies.

While Virgil does not think this exceptional ability of birds is due to a divine wisdom, or greater knowledge of the workings of fate, he is anyway struck by their extraordinary sensitivity to the environment around them and the way “their minds change, and their breasts now conceive impulses” affecting their movement and song. In Latin, this line would read “*vertuntur species animorum, et pectora motus.*” Virgil uses the Latin word *animorum*, which refers to the mind, followed by the phrase *pectora motus*, which means movement of the chest or heart. By juxtaposing these words, Virgil offers
insight into the nature of the Arcadian discourse and the type of relationship it establishes between the narrative elements, people, animals, and plants. Rather, this may be interpreted as the poet’s desire to fully express the vitality of animals and their enhanced sensitivity to changes in the environment which exceeds human perception, thus legitimising their presence as interlocutors in the poem. Virgil’s work does not investigate nature from one perspective, but rather shows how the boundaries between the natural realm and human beings can become indeterminate and blurred.

White’s use of this quote shouldn’t be surprising. Virgil’s works have had a major influence on British culture. It was employed in politics, both to open different directions of thought, and to reinforce the validity of established political positions.5

According to Phiroze Vasunia, even though Virgil’s interpretation was controversial in the 18th century, writers such as Edward Gibbon investigated the Latin writer “to evaluate the working of the (British) empire, (…) its limits and contradictions,” in correspondence with his concern about the American colonies.6 Gibbon understood how attentive Virgil was to the social contradictions of the Roman Empire, highlighting an innovative reading of Virgil’s work.7

Moreover, since the 18th century, Virgil’s poetic renderings of the environment and his devotion to agricultural labour have been idealized in the landscape design of British and American gardens.8
However, White’s use of this quote goes beyond mere cultural appropriation. It illustrates an important connection between Virgil and White that enables an extended perspective on the roots of the Arcadian discourse, as theorized by Worster, even further back into history. And the importance of this connection does not end in philological considerations. The works of both authors delve into the complex relationship between human beings and nature, revealing much about the presence of an ante litteram ecological thought. This is particularly evident if read through the contemporary thought of Félix Guattari. Guattari’s ecological perspective hinges on the idea that the environment’s “register” can only be fully understood when seen as inextricably linked to social relations and “the relationship between subjectivity and its exteriority, including the social, animal, vegetable, and cosmic realms.”

This underlines the vital role of mutual interdependence and interaction between social networks, human subjectivity, environmental concerns, and their fundamental part in ecological discourse.

In this regard, Virgil, more so than White, employs poetic language to narrate the voices, songs, dreams, memories, and internal dialogues of both human and nonhuman characters, including mythological beings, thus conveying an indissoluble interdependence and coexistence between humans and the nonhuman’s world, effectively presenting a form of ecological thinking ante litteram.

White’s quotation of Virgil points to another aspect, even more specific, which unites these writers. It poses
a question about animals’ behaviours, not only in terms of scientific curiosity, but also a kind of wonder and affection for them. This is not just an expression of the two writers’ similar reconciliations with nature but opens to the possibility of weaving a dialogue between them.

It is, therefore, appropriate to begin this study with Virgil, who is considered the originator of one of the highest forms of art: the Arcadian genre, or pastoral literature. Virgil’s works operated as a powerful and expressive poetic model before the Arcadian discourse became a predominantly visual aesthetic.

1.2 The Arcadian genre.

The genre can be defined as either pastoral or Arcadian, depending on whether the place of origin, or the activity carried out, becomes the poetic focus; it stems from the Greek word, βουκολικός, and was later translated as bucolicus in Latin. This adjective literally means pastoral and defines a genre of poetry which historically concerned the shepherds who lived in Arcadia, a Peloponnese region which was characterized by poor vegetation, mountainous terrain, and a population dedicated to sheep farming. Although its historical origins are still debated today, scholars are generally unanimous in identifying Theocritus’ Idylls as the first completed testimony, and consequently the model for
this genre.

Theocritus was a Greek poet born in Syracuse in the 3rd century B.C., who, absorbing the Hellenistic post-Alexandrian culture, envisaged a new poetic form combining both Homeric and popular traditions, through which he could explore new settings, characters, and tales. This innovation was first informed by his Sicilian origins. Having always viewed his homeland with nostalgic eyes, he decided to set the *Idylls* there, partially reframing the image of Arcadia. As a result, an *amoenus*¹¹ and peaceful rural landscape become the renovated setting for Greek shepherds, as the main characters who inhabited the *Idylls*. Mostly, their lives were devoted to poetic songs, and musical competitions to declare their love to woodland deities. ¹²

Due to the transfiguration of places and characters, Theocritus’ work is typically considered to be a poetic transfiguration of reality. However, this perspective has sparked debate among scholars, with some taking the radical stance claiming that Theocritus’ poetry is purely fictional, characterised by symbolic elements;¹³ others that have interpreted it as representative of a form of fictional realism; ¹⁴ and others, such as Emanuele Lelli, who has attempted to illustrate Theocritus’ adoption of an ambivalent approach that is both grounded in reality and rarefied, which he terms a “pragmatic poetry.”¹⁵ Theocritus maintained a sense of reality by referring to popular traditions, beliefs, languages, objects, ordinary events, and locations of shepherds. Through meticulous investigation of ancient texts, ongoing
archaeological discoveries, historical studies on agri-pastoral culture in Italy, and ethnographical explorations of the places where Theocritus lived, Lelli highlights numerous elements, or fragments, in the *Idylls* that can support this contention. This fifth idyll is considered the most comprehensive example of how Theocritus’ poetry refers to the actual lives of shepherds without embellishing it with poetic idealisation. It describes a singing competition between two shepherds, Lacon and Comatas, characterised by poetic composition in the form of close dialogue, which was a common form of oral narrative in the agro-pastoral community of the time. Lelli suggests that Theocritus experimented with this form of dialogue in a written form, directly tapping into the oral tradition without intending to crystallise or elevate it as an exclusive pastoral model. This approach is distinguished from what would transpire in the following centuries, as evidenced by Virgil’s third eclogue. This hypothesis is supported by variations exhibited in the other *Idylls*, such as the sixth and tenth. Therefore, this anachronistic perspective, as claimed by other scholars, downplays the authenticity of the oral source and the genuine intent of Theocritus’ work to represent the diversity of the agro-pastoral world by assigning a complete fictionality and idealizing purpose to it.

This Idyll is rich with clues that firmly ground it in an agro-pastoral reality, showcasing Theocritus’ intimate knowledge of this world. The setting, Sybaris, often considered a poetic reference, indeed existed at the time of Theocritus’ composition, as recent archaeological discoveries
have revealed. Additional hints of this type can be found in colloquial and popular expressions, such as the exclamation “Hey up!” that commences Lacon’s speech, as well as his use of the third person, insults, idiomatic phrases and proverbial expressions. Descriptions of specific objects, such as “skin-coat[s]” still common among shepherds today, and musical instruments like the “parcel o’ straws,” a rudimental whistle still prevalent in countryside areas today, further underscores this authenticity. However, Theocritus, also infuses his characters, their songs, and their surroundings with a sense of elegance, as evidenced in the use of bucolic hexameters. Therefore, according to Lelli, it is through the combination of these two aspects that Theocritus’ descriptions of shepherds and their pastures are not entirely idealised, but are rather a conscious choice to give literary dignity to a little-recognised tradition.

However, it is from this point in history that the meaning of the idyllic came to be connoted with the ideal, extending beyond peaceful and pleasant aspects to incorporate enchanted and dreamy atmospheres. As a result, it has also been associated with utopian characteristics. In this sense, its misrepresentation has contributed to an underestimation of the genre and a loss of the important aspects of its content.

Virgil inherits this legacy in his composition of the Eclogues, or Bucolica Carmina. Virgil’s Eclogues are made up of ten books, written around 42 B.C., the structure of which can be divided into three main groups based on
their content. The first and ninth eclogues evidence the most political content, referencing historical facts and narrating their effects on the shepherds’ fates. The third, seventh and eighth eclogues provide a glimpse into the shepherds’ ordinary lives and their singing competitions. The second, tenth and fifth eclogues seem most intimate due to their interest in love and relationships. The fourth and sixth are stand-alone eclogues that seem tenuously interconnected; the latter, considered Virgil’s manifesto, includes a relevant statement about the world’s origin, and the fourth, regarded as the most controversial, deals with a prophetic invocation of a new Golden Age.

Different to what Virgil communicates later in the *Georgics*, where this connection between realms includes also the agricultural transformation of land, in the *Eclogues*, humans and nonhumans, including even the matter of the soil, appear naturally coexistent without any risk posed by human interference. The representation of this interdependence/coexistence unfolds through three levels, which in combination suggest three aspects that define the core of a pre-ecological conception.

The first level is physical. It concerns soil/ground, as a concrete, thick and vital surface, where tangible and intangible encounters occur, described through visual imagery, sounds, smells, and even tactile perceptions. This level imagines landscapes in which humans, along with their musical instruments, food, animals, plants, and flowers, live and interact with each other.
be fully described without reference to another, as animals are involved in dialogue, and plants reflect the atmospheric conditions. It is easy to recognise these connections between the most stereotyped characters, the shepherds, who have been widely reinterpreted. We find the shepherds dedicated to pastoralism, emphasising a natural connection to their sheep and pastures. They are also almost depicted as farmers, grafting pear trees and rows of vines, tending to forage fields. Such connections gesture to an affection for the land, understood as an umbrella term that includes soil, meadows, woods, rivers, and other geographical features. In this sense, it is understandable why Lycidas suffers in wondering who will make the grass bloom, and further, “who would sing the nymphs.” On the other hand, once we listen to Meliboeus, who refers to those who have worked in vain on their fields for the advantage of others, “unhappy citizens” led by war, we discover that the shepherd-poets are also settlers, well-rooted within their land rather than nomadically spread across it. In the end, they are singers as well as shepherds, attached by affection to the meadows and woods. Through their voices, a constellation of additional landscapes arises like fragments of blossom, praising the abundance of nature. They are inspired by nymphs, including Venus, who populate the woods, mountains, and secret springs, appearing as the recipients of the shepherds’ poems and song, or the causes of their loving pain:

“Sing on, now that we are seated on the soft grass. Every field, every tree is now budding; now the woods are green, now the
year is at its lovelies. Begin, Damoetas; then you, Menalcas, must follow. You must sing alternately; the Muses love alternate verse. 

However, this does not mean that Virgil evokes only flourishing rural landscapes. On rare occasions, he shows a dangerous natural phenomenon: the hurricane, “wolf to the folds, the rains to the ripened crop, to the trees the gales.”

The image is immediately softened into beneficial rain; “Sweet are the showers to the corn, the arbute to the new-weaned kids, to the breeding flock the bending willow.”

Through his memories of the Mantuan countryside, Virgil offers unexpected images of swamps, dry and rocky soils, reeds, and soft riverbanks. Elsewhere, the scene is transported to the dense beech-trees canopied in the shadows of the Sicilian mountains, among daffodils, violets, the dill flower and its perfume, quince, chestnuts, plums, and myrtle.

The second level of Virgil’s representations of natural human-nonhuman coexistence pertains to the historical and political. It is grounded in the concept of soil as constitutive of a land, regarded as a collective political organism that embodies the impact of historical events. In these terms, land is also represented as a place of conflicts, wars, divisions, and despair, contrary to the ideals of home and the safety of an isolated island. Even though the geographical location of the Eclogues is still disputed, there is no doubt regarding their historical background; they were written after the victory of the Triumvirates at Philippi in 42 B.C. against the murderers of Gaius Julius Caesar, Marco Giunio Bruto, and Gaius Cassio
As a reward for this victorious military campaign, they decided to assign the peasants’ expropriated agricultural lands to Roman legionaries, who consequently obtained the right to Roman citizenship according to Roman laws. This caused numerous serious conflicts with those who were dispossessed.

This signals the first step that led to the definitive coronation of Caesar Octavian, once he won the battle of Anzio against Marco Antonio in 31 B.C. In this position of absolute power, and after a century of internal civil war, he sought to consolidate the boundaries of the Roman Empire and the political structure of the republic into a monarchical order to assure stability and peace. This reform affected a variety of administrative, military, and civic structures, impacting the management of rural land, as well as influencing culture and the arts. Its effects did not only apply to shepherds and farmers but extended to a broader community than one might expect. For instance, Virgil describes the lambs that Meliboeus drags with him and the plants that are abandoned to the care of strangers or left to die.

Despite their differences, they will both be destined for the same uncertain, violent fate that will demolish any long-standing contiguity between humans and nonhumans. The first will be uprooted from their pastures.

Even if Virgil suggests a form of affectionate comfort between shepherds and animals, that will likely be fragile and temporary. The second will, rooted in the soil, be left to non-expert hands to maintain, destroying the long-term productive
dialogue that has produced flourishing cultivation over the years.

The third level that represents coexistence between humans and nonhumans in the Eclogues is symbolic. At this level, the inner, or spiritual dimension, and its abstract representation are primarily involved. In this sense, the art of poetry represents one of the most powerful means of transcending physical boundaries, connecting images with words, and conveying an instantaneous sense of the subtle immateriality of things. For instance, Virgil developed Theocritus’ model by incorporating rhetorical device into it, such as allegories, through extensive references to personal events, public figures, and historical facts. Virgil never directly mentions the historical contexts of these events and their protagonists. Rather, he uses rhetorical figures to hide the city names of Rome and Mantua, as well as the name of Octavius, by using pronouns, adjectives, and terms that were Sophistically chosen to emphasize social divisions and injustices.  

Moreover, Virgil emphasises the exchange between inner and outer worlds through a rhetorical figure of anthropomorphism, which is articulated in three dimensions; the attribution of human behaviour to animals, like the lions’ grief for the Daphins’ deaths, the subsequent disruption of the botanical system, “instead of the soft violet, instead of the gleaming narcissus, the thistle rises up and the sharp-spiked thorn;” and the transformation of natural features into interlocutors and observers. Trees and woods are privileged
characters, making sounds, and searching for secrets like the young vines,\textsuperscript{43} and mysterious like the hedge, which “with its gentle hum soothe you to slumber.”\textsuperscript{44} Elsewhere, human feelings are totally transferred into these nonhuman living forms via a symbolic function, as in the case of the young lambs.\textsuperscript{45}

This rhetorical figure is extremely important since it represents the nearest poetic device to understanding the morphism approach, which is more suitable for unravelling current environmental issues, as raised by Bruno Latour.\textsuperscript{46} In addition, Virgil’s words cannot be fully understood without considering the mythological symbols of the landscape depicted in his poem. In the \textit{Eclogues}, this level is easily identifiable by the way that woods, rocks, water, and other inhabitants of the landscape are imbued with the mythological and historical heritage of the Arcadians. On these Virgil, he added his personal beliefs and philosophical thoughts.

1.3 The \textit{Eclogues} and the \textit{Georgics} by Virgil.

The first and ninth eclogues stand out as the most effective and comprehensive examples illustrating how all three levels of the interdependence and coexistence of human and nonhumans – the physical, the historical-political, and the symbolic – are incorporated and overlap seamlessly in Virgil’s poetry. These eclogues narrate the experiences of
four shepherds: Tityrus, Meliboeus, Lycidas, and Moeris.\textsuperscript{47} Although Tityrus was granted the chance to enjoy his land forever, the other three are deprived of their land, which is instead given to Roman legionaries. As a result, they lose their source of livelihood, their status as Roman citizens, and ultimately the lands of their ancestors.

Virgil opens the \textit{Eclogues} by depicting the encounter between Meliboeus and Tityrus. Tityrus is lying down underneath a beech tree’s broad foliage, confident about the future as he managed to keep his land. Meanwhile, Meliboeus appears slowly walking across the fields, bringing with him his sheep, hopeless, without a real destination as an exile from his lands.\textsuperscript{48}

“You, Tityrus, lie under the canopy of a spreading beech, wooing the woodland Muse on slender reed, but we are leaving our country’s bounds and sweet fields. We are outcasts from our country; you, Tityrus, at ease beneath the shade, teach the woods to re-echo fair Amaryllis.”\textsuperscript{49}

The shepherds’ encounter situates the first landscape in Virgil’s \textit{Eclogues}. It consists of a few elements: the horizontal surface of the land sprinkled with free-standing trees, and the forest, which serves as a backdrop. Virgil doesn’t explicitly describe the surface that Tityrus is reclining on, but readers can infer that his pallet is likely comfortable, refreshed by the “idling” shade of a tree. Nevertheless, these intrinsic qualities don’t appear to solely belong to these natural elements; instead, they seem to reflect Tityrus’ inner world - his feelings of security after retaining his land and his
optimism for a peaceful future. In a similar vein, the natural elements provide Tityrus with the most suitable environment for experiencing these feelings. Here, his body can lie and relax to the extent that he plays his pipe, while gazing at the distant forest, echoing Tityrus’ love for Amaryllis. As Tityrus’ surrounding environment vibrates with his inner world, the forest doesn’t undergo a similar transformation but rather symbolically becomes a unique and invaluable interlocutor capable of interacting with him. Their dialogue is so intense that, despite the spatial distance separating Tityrus and the forest, they appear wrapped in a bubble that excludes the surrounding confusion, which echoes the suffering voices of the other shepherds, allowing them to hear the comforting music.50

Although both shepherds are experiencing the same landscape, it seems to undergo a transformation and duplication based on their inner lives. In contrast to Tityrus’ pallet, Meliboeus’ land is rough, characterised by “bare stone” interspersed with dense, bushy hazels sporting low foliage. It is here where his two lambs, the “hope of the flock,” are being born.51 From Meliboeus’ perspective, this fragment of the countryside is likely sun-drenched and not very welcoming. He cannot rest here, but he must continue his slow walk with his flock, which also suffering endures a similar fate. As in Tityrus’ description, Virgil portrays the natural elements in terms of the shepherd’s inner world: the hardness of the ground and the trees vividly embody the harsh conditions faced by the shepherd after being evicted from his
own land. Likewise, rather than being a source of joy, the new-born lambs have now become the sole custodians of his seemingly hopeless situation, symbolically representing a new life condition devoid of a home or a place to stay.

Therefore, by examining how Virgil delineates this first landscape and its components in the relationship with Meliboeus and Tityrus, we can perceive these natural components not merely as background scenery, but as active characters in the poetry. Their physical qualities vibrate in accordance with the shepherd’s inner world to the extent that they symbolically acquire the capability to interact with them and initiate a dialogue, as observed between Tityrus and the forest, or between Meliboeus and his flock. Through these poetic images, Virgil presents the relationship between the shepherds’ inner subjectivity and the external nature as a seamless, intertwined union, both physically and symbolically.

Nevertheless, since these relationships are not limited to the characters themselves and their surroundings, but are tied to social and political events, which multiply and scale up into a broader network. Although Virgil’s story revolves around two common shepherds, the reader can recognize the vivid interplay between natural elements, historical events, and their effects. In this manner, each element functions as an active narrative component, strongly interdependent with others across various levels. And when the vibrant matter of the natural elements alone does not suffice to convey the broader political implications, Virgil enriches the dialogue of the shepherds’ encounter with a deeply semantic density.
From the first five lines of the *Eclogues*, the effects of historical events can be also located being reflected in differentiated pronouns employed by Virgil. Namely, “you” is used as the form of address for Tityrus, setting some distance between the speaker and the shepherd who still enjoys his lands, whereas “we” addresses all those who had to give up their lands, as did Meliboeus. Scholars have highlighted the second-person singular pronoun “you” as a literary transfiguration of Virgil, who benefited from Augustus’ indulgence. It could be utilized as a form of protection for the author. However, this does not mean that Virgil does not convey Meliboeus’ pain in this passage, but rather imagines the expression of an entire community’s collective affectedness at the loss of their lands.52

Meliboeus’ suffering is expressed intensely through the multiple nuances of *patriae* as a political and social term to describe the land.53 This explains all the implications of its loss: “*nos patriae finis et dulcia linquimus arva, nos patriam fugimus.*”54 With the expression “*Patriae finis,*” Virgil emphasizes the value of the land as a space that is geometrically defined by its boundaries; with “*dulcia linquimus arva,*” he refers to land meant for pastures and agricultural resource. However, the adjective “sweet” still reflects an emotional bond with the land as his birthplace and suggests a certain affection for it. “*Patriam*” incorporates a political aspect since the land is described, in administrative terms, as a country.55 It is where Meliboeus was born, where his parents raised him, and where he lived. Additionally, it is
the place where he learned culture, language, and behaviours that shaped his inner nature far beyond spatial features and geopolitical boundaries. However, the use of “we” implies that Meliboeus speaks on behalf of the entire community threatened by the effects of political and social change.

In light of this, the different uses of “you” and “we” can be interpreted as a means of incorporating other stories and misadventures into the work, thus making it universally accessible. According to Annabel Patterson, the fact that Virgil does not use the subject “I” to identify himself as Tityrus leaves the dialogue open and allows the reader to identify with either character. As a result of its inclusive nature, the Arcadian genre has been embraced and reinterpreted throughout history, and even manipulated to serve a variety of individual and collective ideologies: “the very deviousness of the ploys by which “persons” are represented in the Eclogues invites our forming the most basic questions about authorship-questions about how an artist survives in society and what are his obligations: to his fellow citizens, to his patrons, to himself.”

The first eclogue ends with another description of the natural elements, and it is still Meliboeus who opens the scene with the words:

“Happy old man! So these lands will still be yours, and large enough for you, though bare stones cover all, and the marsh chokes your pastures with slimy rushes. Still, no strange herbage shall try your breeding ewes, no baneful infection from a neighbour’s flock shall harm them. Happy old man! Here, amid familiar streams and sacred springs, you shall enjoy the cooling shade. On
this side, as of old, on your neighbour’s border, the hedge whose willow blossoms are sipped by Hybla’s bees shall often with its gentle hum soothe you to slumber; on that, under the towering rock, the woodman’s song shall fill the air; while still the cooing wood pigeons, your pets, and the turtle dove shall cease not their moaning from the elm tops. (…) Ah, shall I ever, long years hence, look again on my country’s bounds, on my humble cottage with its turf-clad roof—shall I, long years hence, look amazed on a few ears of corn, once my kingdom? Is a godless soldier to hold these well-tilled fallows? a barbarian these crops? See where strife has brought our unhappy citizens! For these have we sown our fields! Now, Meliboeus, graft your pears, plant your vines in rows! Away, my goats! Away, once happy flock! No more, stretched in some mossy grot, shall I watch you in the distance hanging from a bushy crag; no more songs shall I sing; no more, my goats, under my tending, shall you crop flowering lucerne and bitter willows!”\textsuperscript{59}

In contrast to the landscape depicted in the beginning, this one appears more complex since it is constituted by three different images: the marshes, the Sicilian countryside, and an anonymous countryside featuring of wheat fields, orchards, and hilly areas with cliffs and caves. \textsuperscript{60}

Even on this occasion, Virgil adopts the same strategy of likening the natural elements to Meliboeus’ inner world to the extent that they symbolise his feelings. Consequentially, it becomes easy to recognise how the enfolding crescendo of plants, animals, and freshwaters – the Hyblean bees feasting on willow flowers, turtle doves perched upon the elm, and hedges inviting peaceful slumber to him like a dear friend taking care of him – echoes the sweet and pleasant memories that Meliboeus holds dear of the countryside he is leaving behind. The same can be said of the third fragment of the
landscape, where Meliboeus wonders, “Ah, shall I ever, long years hence, look again on my country’s bounds, on my humble-cottage with its turf-clad roof – shall I, long years hence, look amazed on a few ears of corn, once my kingdom?” Fruit trees, pastures, and green caves regain their sweetness as objects of a future desire, even when veiled by the awareness that he will probably never return to his homelands. 61

The profound connection between human subjectivity and the external world, as highlighted at the beginning of the eclogue, is here amplified and celebrated. It resides not only in the abundance of natural elements described but also in the impossibility of physically touching or dwelling among them, since they are fully created in Meliboeus’ mind. This connection between a human and a non-human being is entirely immaterial, inserted within a temporal dimension that sways Meliboeus’ past memories to his future desires. As a result, natural elements acquire a symbolic dimension that is extends beyond the spatial aspect to the temporal one.

As previously highlighted, this connection does not remain confined at the individual level, but extends to include the placement of personal events within a broader collective history. The political level, particularly the distribution of lands to non-Roman citizens, is disclosed not only through Meliboeus’ words: “Is a godless soldier to hold these well-tilled fallows? a barbarian these crops?”62 A more subtle way to understand this can be found in the tone of Meliboeus’ words, as he is preparing to depart from his homeland and the absence of “strange vegetation” and “baneful infection” in the
fields that Tityrus intends to protect and care for.\textsuperscript{63}

The ninth eclogue is symmetrical to the first, but the opening question takes the reader to a new landscape that is all but absent from the previous writings: the city. “Where are you heading, Moeris? To town, where the path leads?” asks Lycidas. Moeris replies that the city is the only possible destination for both shepherds who have been uprooted from their fields by “the stranger.”\textsuperscript{64}

Although the city is not a physical entity in the narrative, its shadow can be found in countless ways throughout the work, which it itself suggestive of its negative connotation. It is the place where political decisions are taken, and for this reason the perception of the city varies. Mantua is looked upon as a “greedy” city by Meliboeus, while Rome is “generous” since it allows him to maintain his land.\textsuperscript{65} In search of another place to live, the shepherds walk silently and hopelessly into the city. Just as in the first eclogue, in which no shepherd can sing, Moeris is unable to sing aloud due to his similar fate. He can only compose a song in his head about the upcoming spring as a memory of his beloved and lost countryside.\textsuperscript{66}

Even when love is not reciprocated, the ability to speak or sing still occurs. It is the opposite, the love pain acts as a trigger, as with Corydon, who uses his songs of love to try to win the indifferent Alessi over: “O cruel Alexis, care you naught for my songs? Have you no pity for me? You will drive me at last to death?”\textsuperscript{67} The tenth eclogue can be considered a poem or song, as a direct offering from Virgil to Gallus,
intended to relieve him of his love-desperation. In this, song is not just a medium for human communication but can be understood as an intangible substance that can heal the trees, pines, and laurels, the sheep, and even rocks as if a medicine, all of which empathises with a shared suffering. At first glance, these aural aspects can be viewed as a fundamental bridge between humanity and nature. However, looking at the multitude of relationships presented, it becomes apparent that voices, including songs, music and poems, can have a greater significance than just being a means of communication or emotional expression.

This meaning can be found within the mythological tradition inherited by Greek culture. Hermes and Pan are said to have been born in the Arcadian region. Hermes symbolised mediation and communication between mortals and the divines, the living and dead, as well as the richer and poorer classes of citizens. According to Aristophanes, Hermes also worked in solidarity with the animal world and, in fact, was the guide of shepherds with his caduceus donated by Apollo. Furthermore, he was the god of orators, authors, and poets, and he invented the lyre from the shell of a turtle.

It is Pan, however, the god of pastures, vegetation, life force, fertility, and primitive instinct, who was recognized as the “Lord of Arcadian.” On the one hand, the figure of Pan embodies the concept of whole, as it consists of a lower animal body connected to the ground by its hooves, and a human upper body and gaze that symbolises his divine origins. Nonetheless, his figure conveys an uncanny sense
of ambivalence and strangeness which is perfectly suited to his Arcadian territory - distant and separate, yet also representative of an alternate dimension. This characteristic, however, has never led this mythological figure to oblivion. Pan has been the subject of theological, philosophical, and artistic reflections for centuries. These have resulted in an ambivalent judgment; Pan is seen as the embodiment of demoniac and perverse aspects, and conversely, as guardian of the creative and transformative forces of the universe.

A symbol of this transformative and creative power can be found in the myth of the creation of the Syrinx, of which its name originates from the nymph Syrinx who, in trying to escape Pan as he pursued her, was transformed into marsh reeds. After failing to capture her, Pan was left with only the delicate sound of wind passing through the plants, from which his musical instrument was derived. Music thus suggests a privileged, creative, and spiritual link between inner and outer worlds, and states of living and dying.

Supporting this perspective on the meaning of voice and song in relation to the shepherds’ speech, further evidence can be gleamed by examining the role of music in the shepherds’ Arcadian lives as described in annals or historical documents rather than in mythology. Monica Ferrando’s research reveals that the medium of song was essential for sharing and transmitting Arcadian laws, with the Greek word nomos, meaning law, having original etymological ties to music and pasture. The term nomos generally encompasses natural laws both those of human beings and the natural world,
either in opposition or harmony. The concept of justice, *dike*, is part of the *nomos* of human law, distinguishing it from natural law. Despite the debate over the etymological origins of the term *dike*, scholars agree on its meaning being close to that of judgment, decision, and correct behaviour.77 Extending beyond the legal and pragmatic spheres, *dike* has been interpreted as a bridge between the cosmic, divine, and natural orders with individual interests. According to Ferrando, in ancient societies, there was a perfect coincidence between *nomos*, codified human laws, and *dike*, as a justice including a transcendent value and preceding human law.78 As a result, respecting *nomos* meant respecting *dike* and vice-versa. Given this equivalency, the use of the shepherds’ voice-song in *Eclogues* has an initial implication. Due to law and music being intertwined in the Arcadian tradition, the silence of the shepherds may be interpreted as a symptom of disharmony. The injustice of losing their land is symbolized by the decline of their abilities to express themselves through song. Since *dike* is considered to be a bridge between the divine, cosmic, and natural realms, a second implication can also be drawn. This is that respecting *nomos* is not just synonymous with respecting *dike* and vice-versa, but also includes the respect for natural laws. Thus, in the Arcadian genre, the connection between law, music, and justice extends to the natural world; and when there is justice, the shepherds spontaneously and harmoniously sing in their home environments.

Additionally, drawing on the insights of the Greek poet Alcmane, Ferrando illustrates how the concept of *nomos*
(law) was specifically attributed to birdsongs, which vary by species and conform to normative modes. This insight sheds light on the significant role of birdsongs in White’s and Virgil’s writings, serving to articulate the connections between humans and non-human realms in terms of the intrinsic harmony within their vocalizations. The power of the voice in connecting human and nonhuman realms is even more evident in those eclogues related to singing contests. In addition to their healing power, the shepherds’ songs also serve as spiritual praise for the springtime, and the natural flourishing of environment.

Upon comprehending the voice within these parameters, the multifaceted implications of the term land come into focus. Here, land signifies the nurturing soil that nurtures all living beings – a dynamic surface intertwined with tangible and intangible connections that continually reshape the cycles of natural and cultural evolution. This interpretation of soil encapsulates an ecological perspective reminiscent of Earth as a self-regulating complex system, where all organisms and their inorganic surroundings are closely interconnected to form and maintain the conditions of life, as articulated by James Lovelock. Virgil’s work seems almost to anticipate this interconnectedness emphasising the interplay between living and non-living elements. The Gaia theory, which underscores the close relationship between interacting forces as integral components of a larger interconnected whole, each of which shapes, influences, and modifies the other. In addition to being influenced by their
environment, living organisms actively change it and vice-versa. Latour explains that Lovelock’s theory of Gaia as a self-regulating living organism represents the “symmetric inversion” of Galileo Galilei’s conception of cosmology. According to Latour, this latter conception contributed to the modern bifurcation of the couple nature/culture, which later became the foundation of Descartes’ philosophy and those who followed him. Lovelock’s theory represents a modern attempt to redefine the nature-culture relationship, transcending their historical dichotomy. Virgil’s world aligns with this holistic understanding, bridging Lovelock’s theory with the Arcadian discourse.

Moreover, in delineating the interdependencies between the living and non-living domains, Lovelock asserts their equal significance in sustaining the Gaia system, emphasizing the vital role of inorganic matter as an integral component of the ecosystem. While Lovelock alludes to interactions involving microorganisms and inorganic elements, aspects unknown to Virgil in the scientific and chemical realm, Virgil’s descriptions unmistakably convey a unique sensitivity. Rooted more in poetry than scientific discourse, Virgil’s narrative adeptly illuminates the relevance of connections between living and non-living systems acknowledging the specific role played by the latter.

Additionally, through the guise of the shepherds, Virgil’s words give voice to whoever or whatever is silenced by unfairness or carelessness. As a result, a land characterised by consciousness and respect of nature’s temporal rhythms
can give rise to justice, peace, and well-being in society. Being aware of natural cycles means being aware of the ecological system in which we belong. 83

A theorization and a full explanation of the relationships between justice and peace - inseparable for Virgil - and nature’s cyclical temporality can be found in the fourth and sixth eclogue. Beyond their different content, they stand out from the other eclogues as the only two in which Virgil uses the first person, and as where he also mentions ‘Arcadia’ for the first time. A simple explanation as to Virgil’s use of the first person is provided in the fourth eclogue, where he explains the purpose of his poetic work: it is a “hymn your deeds,” for an upcoming era of freedom, justice, and peace. 84

Therefore, Virgil can be understood as not only composing the poem, but literally entering into it by becoming a shepherd himself. The use of the first person is more than just an assertion of his subjectivity. It is also an attempt to commit himself to a broader political objective, which, is encapsulated in his reference to Arcadia. Virgil places his characters in a variety of landscapes, including the Sicilian and the Mantua countryside, where he was born. However, when he explains the purpose of his poem, the Arcadian landscape appears in its entirety. He intends his poetry to be so powerful that it will be the source of victory for all the inhabitants of Arcadia, including his own victory in Pan’s singing contest.

The debate regarding the placement of Virgil’s Eclogues has generated attention among scholars. Among many, Bruno Snell uses the expression “Arcadian as a
spiritual landscape” to emphasise the importance of Greek cultural heritage over that of other countries when discussing the purpose of Virgil’s poetry. According to Snell, the Arcadian landscape was evoked by Virgil to point to a new political scenario. It was an ideal landscape in several senses, being far enough away from historical events situated in Rome whilst also representing a place where “myth and empirical reality flow one into another.” Additionally, the Arcadian soundscape and its shepherds symbolically embody a “sublime and inspired existence,” which could also provide healing for the human spirit. Therefore, Virgil’s choice to evoke Arcadia as a setting for his poetry is not simply an emulation of Greek tradition, nor a suggestion of escaping reality. It instead seeks to locate the possibility of another political, social, and spiritual dimension.

The recent study conducted by Monica Ferrando, already mentioned above, offers extensions of the direction taken by Snell’s hypothesis. She investigates whether Arcadia also represented a real political model that Virgil might have observed elsewhere. Her detailed, almost archaeological, work is based on information gathered from Pausanias – a Greek writer and geographer of the 2nd century A.D., who wrote a description of Greek regions in ten books, including Arcadia – along with Plato, Aristotle, and many others. The Arcadian reconstructed geographical image within Pausanias’ work is certainly of the mountainous terrain inside the Peloponnese peninsula but, according to Pausanias, it was
constituted in antiquity by a constellation of cities that were generally organized both politically and economically as a confederation based on a pastoral economy. This model was the opposite of the Athenian system upon which the political model of the Western polis was based. This structure suggested a unique conception of law and justice, defined “particular[ly] as a musical harmony and a way of inhabiting the earth.”

According to Ferrando’s findings, despite multiple versions depicted throughout history, Arcadia was rooted in reality. It was a political system capable “of identifying and possibly correcting the unnatural imbalances that the polis would have encountered.”

By emphasising these specific features of Arcadia, Ferrando, Snell, and even before, in Lelli’s regard of Theocritus, suggest looking beyond the literary transposition of geographical characteristics of Arcadia and, instead, focusing on its intrinsic political and spiritual meaning. This supports Worster’s hypothesis that a body of pre-ecological thought existed within the natural sciences before the study of ecology was itself fully defined, and thus provides the opportunity to investigate how also influenced theories of architecture and the physical transformation of space. Since the Arcadian political model has been disavowed for centuries, it was likely that it was disruptive at the time and not widely accepted. But, on the other hand, it represented a fascinating alternative, of which both Theocritus and Virgil were certainly aware.
Therefore, the two writers, when they refer to Arcadia, might gesture to these political and social aspects rather than its geographical and morphological components. Similar to the Idyll, which has taken on meanings distinct from its original etymology by incorporating different visual and cultural apparatuses over time, it is possible to argue that the Arcadian discourse has also been reduced to a single nuance or trope. Arcadia is related to as an idyllic place, a separate realm beyond reality, rather than offering a fuller, disruptive and fascinating, perspective on its spatial and political possibilities. Therefore, the Arcadian reference in the *Eclogues* can be viewed as a transposition of the concepts of justice and peace beyond geographical boundaries.

In this regard, the emphasis that has been placed on Virgil’s countryside as a symbol of an idyllic and protected landscape in contrast to the city, the latter seen as corrupt should also be dismantled. It is not the countryside or cityscape that provides justice, peace, or pleasure *per se*, but instead positions a spatial political system by recognizing the significance of coexistence and interconnectedness between human consciousness and natural cycles of environmental transformation.

This presents a final aspect that warrants further clarification; it is interesting how this time of justice and peace coincides in Virgil’s poetry with the flourishing of nature and its cyclical transformation. Springtime is not just a metaphor that expresses the harmony of justice and peace. It comes to embody a spiritual vision of life that Virgil urges
his readers to consider. The fourth and sixth eclogues, taken together, reveal Virgil’s concept of temporal cyclicality that contributes to building this perspective. In the fourth Eclogue, Virgil describes the idea of a future era, which coincides with the birth of a newborn. Although the identity of this child is still a matter of debate among scholars, its link with the sixth Eclogue, in which the origin of the world is traced back to Virgil’s time, cannot be denied. Their connection mirrors the cycle of nature by encircling different temporalities - the past, present, and future, of both the Arcadia and Virgil’s own lifetime.

However, Virgil’s concept of time does not emerge linearly throughout the Eclogues. This concept is then developed further in consideration of several paragraphs of the Georgics. 92

The influence of Epicurean thought, articulated through De rerum naturae by Lucretius, is quite evident from the conceptualisation of emptiness, the inane, particles. 93 In fact, Epicurean philosophy stated that indivisible particles would have taken shape from the empty entity, fabricating fire, water, and earth for the creation of all things - plants, animals, and human beings.

Preceded by one of the many images of “Spring that clothes the glades and forests with leaves, in spring the soil swells and carves the vital seed,” a description of the development of first life on Earth unfolds from line 325 to line 345 of the second book of the Georgics, where Virgil completely mirrors the contents of the sixth eclogue:
“Then does Heaven, sovereign father, descend in fruitful showers into the womb of his joyful consort and, mightily mingling with her mighty frame, gives life to every embryo within. Then secluded thickets echo with melodious birdsong and at the trysting hour the herds renew their loves; the bounteous earth prepares to give birth, and the meadows ungirdle to the Zephyr’s balmy breeze; the tender moisture avails for all. The grass safely dares to face the nascent suns, nor does the vine tendril fear the South Wind’s rising or showers launched from the skies by the blustering North, but puts forth buds and unfurls its every leaf. Such days as these, I can imagine well, shone at the dawn of the infant world and took no different course: springtime it was, the whole wide world was keeping spring, and the east winds spared their icy blasts: then the first cattle drank in the light, the earthborn race of men reared its head from the stony plains, and the woods were stocked with game, the firmament with stars. Nor could the tender beings endure the world’s harshness, did not between the seasons’ cold and heat come such repose, and earth receive the blessing of a clement sky.”

In contrast to the Eclogues, Virgil here skips an explanation of the origin of the cosmos and its primary elements in favour of concentrating directly on the image of fertile rain, of “Heaven, sovereign father” (Jupiter), which fecundates the Earth, originating plants, animals, and humans. This description is indebted to Greek authors, including Aeschylus (Fragment 44, Danaid), and, once again, to Lucretius’ explanation of the origin of living things, contained in the fifth book. Echoing Lucretius, this event is like the first flourishing of a field in spring: after the creation of the cosmos, plants are the first to grow, followed by animals and then humans: “springtime it was, the whole wide world was keeping spring.”

In Lucretius’s system, however, this process is not
cyclical and perennial but rather prone to degeneration: “earth and sky will collapse as well\(^9\) (...) like a woman exhausted by the passing years.”\(^{98}\) Even though this process involves all living beings as much as matter, Lucretius holds that humans are the most vulnerable to degeneration due to their innate fragility. Unlike animals, which are provided with food and clothing by nature, humans are described as naked and crying children who need protection and clothing. On the one hand, this vulnerability has led human beings to become inventive and ingenious in order to defend themselves against hostilities, developing arts and organising complex social groups. On the other hand, this process has led to a vicious circle of perpetual greed in which humans could be interpreted a privileged, defending themselves at the expense of other living creatures.\(^9\) This image became popular in Pliny, but also among humanists, such as Leon Battista Alberti in the 15th century.

On the contrary, as noted by Luciano Landolfi, by describing the origins of plants, animals, and living beings as a sequence of simultaneous events - “I can imagine well”\(^10\) - Virgil situates himself as present witness to images of the initial genesis of life on Earth, as if it were a familiar springtime. At the end of the second book of the *Georgics*, this perspective is reiterated and extended further by Virgil’s mention of the future era as a fresh springtime. The world will transform: plants will return to their natural state without being cultivated, and humanity will change its destructive attitudes, slowly building a more peaceful world. In total, the
concept of spring is stretched over time and space, literally and symbolically.

In leaving the concept of the present, past, and future ambiguously interrelated Virgil affirms the cyclical concept of time that is evidenced in natural cycles. However, this finds its reflection in the human realm, in agricultural and pastoral activities, rituals, and rites that are synchronized with the seasons and weather conditions. As Michel Serres describes in the *Natural Contract*, peasants and sailors were immersed in a time regulated by the seasons. This affected every aspect of their life. Hence, they spoke the language of the world, maintaining an unconscious connection with the natural cycles. It is a dimension of time that has been lost today.\textsuperscript{101}

Virgil’s aim is not to refute erroneous beliefs and reveal the true nature of all things, as Lucretius did.\textsuperscript{102} In a certain way, he embraces a more abstract indeterminacy of what counts as truth and nature, in order to be more effective in his poetic and philosophical project. According to Gian Biagio Conte,\textsuperscript{103} Virgil attempts to formulate a new cultural and spiritual perspective based largely on Lucretius’ scientific arguments, but expanded upon using Stoic philosophy and, in particular, the metaphysical principle of the inherent rationality of the cosmos as an expression of the Platonic *anima mundi*.\textsuperscript{104} By recognising the generative force articulated by Lucretius as a bridge to the *anima mundi*, Virgil perceives the seamless connection between nature and culture, between civitas and nature. It is at the end of the second book of the *Georgics* that Virgil explains his perspective:
“Blessed is he who has succeeded in learning the laws of nature’s working, has cast beneath his feet all fear and fate’s implacable decree, and the howl of insatiable Death. But happy, too, is he who knows the rural gods, Pan and aged Silvanus and the sisterhood of the Nymphs. (...) He plucks the fruits which his boughs, which his willing fields, have freely borne; nor has he beheld the iron rigors of the law, the Forum’s madness, or the public archives.”

This perspective does not imply that Virgil is unaware of the earthly suffering of human beings. On the contrary, he expresses horror at war and empathises strongly with people affected by plague. He conveys this same reaction to the suffering of animals: “Of what avail is his toil or his services? What avails it, that he turned with the share the heavy clod?” Here, the poet asks the dying ox what life means, demonstrating his attentiveness to and compassion for animal as well as human life. These are certainly not the types of words we would find in Lucretius, who is more concerned with demonstrating the causes of events than expressing his compassion.

Even with this awareness, Virgil’s perspective does not alter, but rather it allows him to also appreciate that the “soil is native force,” specifically by its inherent fertility and the generosity of Earth. His praise is reserved for the land, since it is both a place of residence for all living species and an object of human interest. Even when Virgil describes the peasant’s struggle against nature, he does so from the perspective of cultivating plants as an art form:

“And when their early youth has fresh leaves budding, you must spare their weakness, and while the shoot, speeding through the
void with loosened reins, pushes joyously skyward, you must not yet attack the plants themselves with the knife’s edge, but with bent fingers pluck the leaves and pick them here and there. Later, when they have shot up and their stout stems have now clasped the elms, then strip their locks and clip their arms – before they shrink from the knife – then at last set up an iron sway and check the flowing branches.”¹⁰⁹

According to Virgil, shepherds and farmers, who are fully devoted to agriculture and the natural world, lead the most fulfilled lives. Agriculture is still not only meant as an activity and form of labour but as a source of moral virtue. In this sense, the countryside is depicted as one of the most virtuous spaces since agricultural activity and nature offer a symbolic model of civitas. In this sense, the countryside symbolically embodies the idea of justice and innocence, the equilibrium of human and natural realms in terms of coexistence, and the opportunity for the flourishing of the arts, a fundamental element of the Virgilian vision:

“O farmers, happy beyond measure, could they but know their blessings! For them, far from the clash of arms, most righteous Earth, unbidden, pours forth from her soil an easy sustenance. If no stately mansion with proud portals disgorges from its halls at dawn a flood of those who have come to greet its lord, if they never gaze at doors inlaid with lovely tortoiseshell or at draperies tricked with gold or at bronzes of Ephyra, if their wool’s whiteness is not stained with Assyrian dyes or the service of their clear oil is not spoiled with cassia: yet they have sleep free from anxiety, a life that is innocent of guile and rich with untold treasures. The peace of broad domains, caverns, and natural lakes, and cool vales, the lowing of oxen, and soft slumbers beneath the trees – all are theirs. They have woodland glades and the haunts of game; a youth hardened to toil and inured to scanty fare; worship of gods and reverence for age; among them, as she departed from the earth, Justice left the last imprint of her feet.”¹¹⁰
A number of minor authors continued the legacy of Virgil over the centuries until it came to be embraced by Francesco Petrarch, Giovanni Boccaccio, Leon Battista Alberti, Cristoforo Landino, and finally, Jacopo Sannazaro, whose book, *Arcadia*, became so popular that it spread throughout Europe. Their return to Virgil was not only sparked by a desire to rediscover classical authors. Beyond the naturalistic and idyllic patina cortex on which Arcadian literature was based, opening to the richness of multiple layers of content, as Virgil did, these writers expressed their voices through this genre in their own times of significant political and economic turmoil. Their works included historical events and reformulated philosophical concepts and religious beliefs.

In this sense, the political environment in Italy was particularly conducive to the flowering/flourishing of renewed literary interest in Virgil and Arcadia. Unlike other countries that moved towards the formation of monarchies and nation-states through the 11th century, the Italian territory featured disparate political entities corresponding to city-states, particularly in the northern and central parts of the country. Milan, Bologna, Florence, and many other cities, were governed by civic institutions and corporations of citizens. Along with them, the first *Republiche Marinare* were born, such as Genoa, Venice, and Amalfi. This unique geopolitical landscape contrasted much of Europe, resulting in enormous
terrestrial fragmentation and political instability caused by both internal and external conflicts. Beginning in the 14th century, this situation prevailed for some time through the development of Comuni into Signorie, dukedoms, as the figure of the civic institution was gradually replaced by autarchic and individual forms of government legitimised through hereditary dynastic families, such as Visconti in Milan, Medici in Florence, Estensi in Ferrara, and Gonzaga in Mantua.

While scholars have recognised that Dante’s Eclogues restored the bucolic genre, and many of other contributions focus on Virgil mirroring through Servius’s comments, Petrarch’s Bucolicum Carmen is regarded as most bringing the genre back to into artistic popularity. In applying the narrative potentials of the genre to the Bucolicum Carmen, Petrarch developed a work that was uniquely political in its message: his concern focused on the rapid decline of Italy, following the move of the Pope from Rome to Avignon, which represented the last symbol of Italian unity. Even in the tenth eclogue, which is considered the closest to Virgil’s model in terms of its description of nature, Petrarch articulates “a humanist ideal, a dream of Italy united once more under a strong and stable central government, located in the city of Rome and blending the old principles of constitutional government and civic liberty with the transcendent principles of Christianity.” However, Petrarch’s revival of the Arcadian tradition was not merely politically motivated. The choice of this genre can also be explained by the author’s
particular interest in nature as a mirror of the poet’s inner life. This exchange between the inner human dimension and nature cannot be considered a novelty. Virgil had previously used it in the *Eclogues* in the depiction of dialogues between shepherds and animals and plants.

However, many scholars, such as Karlheinz Stierle, analysing Petrarch’s approach, have also highlighted how he revealed a primeval conception of the landscape, particularly within his letter and *Canzoniere*, written around 1373. He was one of the first to identify landscape as a visual and cultural unit, opening the way to the separation of nature and culture by activating a process of subjectification through the former. On the other hand, it cannot be ignored that Petrarch’s works originated from his true affection for the natural realm, and his disaffection with the development of cities. Therefore, Petrarch’s works demonstrate his ability to understand precociously how human beings were able to transform their environment deeply and destructively. In favour of this latter perspective, as Manfredo Tafuri noted, both Petrarch and Leon Battista Alberti held dear “the reconciliation of *civitas* and nature,” rather than their division.

Whilst Manfredo Tafuri draws a connection between Petrarch and Alberti, Eugenio Garin further suggests, in reference to Alberti, that the echo of their concerns is also readable in *De Planctu Naturae* by Alain de Lille, appearing at the end of the 11th century. Garin’s observation is extremely valuable since it reveals how possible insights, observations, and concerns have been overshadowed by
the dominant historical narrative. Instead, some individuals already sensed, even in the early stages of political, economic, and physical transformation, the possible risks of disrupting the relationship between nature and human beings.

Understanding Alain de Lille’s thoughts requires taking a brief look at the culturally innovative perspectives of the Chartres School, with whom he was culturally connected. Through their different approaches to cosmological issues, illustrated in their studies of Plato and particularly Timaeus, as well as Pliny, Virgil, and Cicero, the members of the school of Chartres reconsidered aspects of Christian theology, including the role of nature. Particularly, William de Conches’ interpretation of anima mundi, explained within the Philosophia Mundi, Dragmaticon, suggests the inheritance of Plato and Plotinus, and incorporation into Christian theology conceptions of nature as a generative realm rather than an auxiliary realm of God. This perspective was accused of heresy, leading to William de Conches revisions of ontological status of nature by defining as a second efficient cause after God, being bound to the physical real world. The impacts of this new attribution extended beyond theological concerns, and not without stirring further debate. The natural realm could once again be fully appreciated in its physicality by humans rather than serving as a means to contemplate God. This new perspective accelerated the development of secular culture, triggering future scientific and naturalistic observations and re-grounding the role of humans in society. Although, it can be seen how this increasing interest opened
the door to the further objectification and conquest of nature.

In terms of this, despite the multitude of themes and their subsequent interpretation by contemporary scholars, Alain de Lille’s De Planctu Naturae seems to fundamentally critique the exploitation of nature. This work, written in Latin and made up of alternating poem and prose texts, describes the encounter and dialogue between a poet and personified feminine figure of ‘Nature’. This is used by Alain de Lille as a literary tool expedient to clarify his thoughts on philosophy and theology, as investigated by de Conches.

Nature is represented as a beautiful woman with shining hair and a candid face, featuring a “clear calm of the eyes,” “fragrant and lovely” nose, and “banquet of delicate perfume” that emanates from her breath and “gently rounded” lips. This picture of Nature seems to anticipate Botticelli’s painting, La Primavera, if it weren’t for a significant difference - Alain de Lille’s Nature approaches the poet crying. Both parts of De Planctu Naturae, the prose and poetry, open by describing pain and tears that contrast an amazing image of ‘Nature’:

“I change laughter to tears, joy to sorrow, applause to lament, mirth to grief, when I behold the decrees of Nature in abeyance;”

She is not just beautiful and elegant, but wears a luxurious, multicoloured dress, decorated with a huge variety of animals: birds, fish and mammals that are more than just static ornaments. Some of them serve a narrative function; for example, through their movement, the eagle shows the
life cycle of birth and death, from youth to old age. Some reveal their allegorical meanings, as taken from the Medieval Bestiaries’ tradition, while others are simply represented by their physical and behavioural characteristics without any symbolic meaning. Although there is a wide variety of creatures and characteristics attributed to Nature, all her “parts were united in unbroken elegance, and suffered no discord nor division”\textsuperscript{124} except in the middle, where she shows signs of “abuses and injuries;” here is where Alain de Lille locates the human being. As anticipated in the prose writing, the human being is revealed as the real cause of Nature’s pain by de Lille, suggesting hierarchy and disorder: “He is both predicate and subject.”\textsuperscript{125}

At the end of the seventh prose chapter, pressed by the poet’s questions - “why thy features are bedewed with a shower of weeping, what the tears on thy countenance foretell?”\textsuperscript{126} - Nature begins to explain the reason for her journey and the origin of her pain. To explain this, Alain de Lille brings in the mythological figure of Venus. As already seen with Plato and Lucretius, Nature is meant as a generative force here, and is represented as a feminine figure. However, differently from Lucretius, Alain de Lille decides to separate the character of Nature from that of Venus. Both functions together to suggest the divine unity of the birth of all living creatures. Specifically, Venus serves to complete Nature’s generative process, maintaining harmony in the Cosmos: “peaceful process” entails “plurality returned to the unity, diversity into identity, dissonance into harmony, discord into
concord.” This agreement is recognised by Alain de Lille, regarding “All things, then, agreeing through invisible bonds of union.”

By reflecting on these bonds, Alain de Lille’s choice of figuring the poet as a counterpart in dialogue with Nature becomes clear. Therefore, a poet, more than a philosopher, is regarded as someone who understands this awareness and conveys it effectively. As for Virgil and others after him, described later on, the poetic attitude reappears again as the most effective means of explaining the contiguity between humans and non-humans.

However, Venus’ adulterous and corrupt behaviour threatens the divine harmony. As many scholars have claimed, this corruption metaphorically concerns those sexual aspects considered immoral. Looking from the Christian point of view, the role of Venus can be considered a metaphorical representation of the dangerous and immoral aspect of nature.

However, Alain de Lille emphasises the negative effects of human beings on Nature, confirming Garin’s observation. He claims that humans, who were originally born in harmony, turned to irrational and harmful actions with regards to all other living beings led by their greed, causing an unfixable disorder within the cosmos. They are fully responsible for violating the natural harmony determined by God, which is physically realised and preserved in nature. Regarding the exploitation of human beings, Alain de Lille’s feminine figure of Nature claims, “the treasury of almost all my riches, tries to overthrow the natural impulses of nature.”
Moreover, as explained by the metaphor of distorted harp notes, human beings’ behaviour does not just exploit Nature but also betrays their own inner nobility. The work finishes with a vain promise that Nature will fix the damage done to her by humanity, something that can only be partially maintained as long as she is subjugated in a subsidiary role to God.

This paradoxical position finds a final solution in *Anticlaudianus*, a work written at the end of Alain de Lille’s life. Here, Nature is supported by God and decides to create a new human being, regenerated via divine breath, and assisted by Virtue, so as to re-establish harmony. The conclusion of Alain de Lille’s book underlines the crucial role of technè in the transformation of nature, which would later become one of the central issues of the Renaissance and the questioning of the role of art.

According to Garin, Alain de Lille’s hints of human beings’ destructive behaviour affected Leon Battista Alberti’s thoughts, as evidenced in *Theogenius*. Along with Mirtia, he wrote two pastoral writings in vulgar Italian, which carried on the legacies of Petrarch and Virgil. Particularly in *Theogenius*, he initiated his investigation into ethical and spiritual aspects, which would accompany him throughout his research, up until to his latest work, *On the Art of Building in Ten Books*, which is considered one of the first theoretical treatises on architecture.

Therefore, his contribution serves as a bridge between the literary and architectural discipline. Following this sense, Alberti’s works take up a central role in the considerations of
the next chapter, in an attempt to further examine Manfredo Tafuri’s gesture to the possibility of a “Rhetorical Arcadian Naturalism,” specifically concerning the aesthetics of the city and its territorial transformation.
Endnotes

2 “equidem credo, quia sit divinitus illis Ingenium.”
   Ibid., 129, lines in Latin 415-416.
6 Edward Gibbon was a British historian who lived between 1737-1794. He was the same age as Gilbert White.
7 Edmond Burke adopted Gibbon’s reading of Virgil “to warn his audience about the violent corruption of the East India Company and claimed to be acting zealously for the principle of justice, the people of India, and the honour of Great Britain.”
10 Today, social relations “tend to be reduced to a bare minimum; (...) neighbourhood relations are generally reduced to their meanest expression” and “the relationship between subjectivity and its exteriority – be it social, animal, vegetable or Cosmic –is compromised.” Guattari argued in *The Three Ecologies* in 1989 that the fragility of social and mental relationships was an ecological issue just as much as an environmental one. For this reason, they could not be separated from each other.
11 From Latin, *amoenus* means charming.
The seventh chapter, “Bucolic and Pastoral in Theocritus,” is entirely devoted to Theocritus’ *Idylls*, beginning with the Seventh Idyll, as Halperin regards this as Theocritus’ manifesto, in which most of the components of his poetry can be found.

A series of accurate descriptions and explanations of *Idylls* and their characteristics is provided in the essays contained in the collection: Marijke A. Harder, Remco Regtuit, Gerry Wakker, ed. *Theocritus* (Groningen: Egbert Forsten, 1996).

Roger James Cholmeley, “Introduction,” in *The Idylls of Theocritus* (London: G. Bell & Sons, 1919), 1-60. For a comprehensive picture of Theocritus’ poetry, consider the two parts “Theocritus’ Verse, Style and Dialect” from page 36 to 45, and “The pastoral” from page 58-60.

In addition, Poulheria Kyriakou, Evina Sistakou, Antonios Rengakos, ed., *Brill’s companion to Theocritus* (Boston: Brill, 2021). This book provides a comprehensive overview and analysis of Theocritus’ works.

13 The idea that Theocritus’ poetry is a result of fiction, where the characters and their lives are entirely symbolically transfigured, has been particularly supported by Mark Payne in *Theocritus and the invention of fiction* (Cambridge: Cambridge University Press, 2007). The same critical position is supported by Charles Segal, *Poetry and Myth in Ancient Pastoral* (Princeton: Princeton University Press, 1981).


16 Among these studies, the most relevant are Giuseppe Pitrè, *Usi, costumi, credenze e pregiudizi del popolo siciliano* (Palermo: Biblioteca delle tradizioni popolari siciliane, 1889); Salvatore Salomone-Marino, “Costumi e usanze dei contadini in Sicilia,” *La Sicilia* III, n.47 (1879): 4- 51; Lionardo Vigo, *Raccolta amplissima di canti popolari siciliani*, (Bologna: Arnaldo Forni Editore, 1974)


18 See endnote 13.

19 “Beware, good my goats, of yonder shepherd from Sybaris, beware of Lacon; he stole my skin-coat yesterday.”


According to Lelli, new archeological discoveries have proved that the Greek colony in Italy, Thurii, known to Theocritus, was based on Sybaris. Lelli, *Pastori antichi e moderni*, 52.
“Hey! my pretty lambkins; away from the spring. See you not Comatas that stole my pipe two days agone? Pipe? Sibyrtas’ bondman possessed of a pipe? he that was content to sit with Corydon and toot upon a parcel o’ straws.”
Theocritus, *Idylls V*, lines 3-4, 63.

“Yes, master freeman, the pipe Lycon gave me. And as for your skin-coat, what skin-coat and when has ever Lacon carried off o’ yours? Tell me that, Comatas; why, your lord Eumaras, let alone his bondman, never had one even to sleep in.”
Theocritus, *Idylls V*, lines 9-11, 63.

According to Lelli, the third person was a popular manner of speaking when trying to conceal something, and not only an element of poetic refinement. Lelli, *Pastori antichi e moderni*, 61.

“And as your foul envious eyes watered for it then, so your foul envious hands have bid me go henceforth naked now.”
Theocritus, *Idylls V*, lines 12-13, 63. Lines 39-42 provide additional examples.

See endnote 20.


The *Eclogues* contain several loves of shepherds, often unhappy. For instance, in the second Eclogue, Corydon is in love with the young lady Alessi. An unhappy because unrequited love sung to nature. In the third Eclogue, Galatea is the one in love with one shepherd. The fifth deals with Daphins’ death, a loving friend of Mopsus. Gallus’ love is described within the tenth eclogues.

An extensive explanation of the fourth eclogue can be found in Michael Courtney Jenkins Putnam’s, *Virgil’s Pastoral Art. Studies in the Eclogues*, (Princeton: Princeton University Press, 1970), 136-165. The author explains the classical notion of the Golden Age and its implications from page 141, where he claims: “Even while fraternal strife persists, Virgil, the seer, can prophesy that the iron race-ferreus is an adjective Virgil ever associates with war-will collapse. In its place the golden age will be renewed, an age which a chaste goddess (the word casta is stressed) can bless and into which Iustitia can return.”

The same book contains an explanation of the sixth eclogue from page 195-221. Putnam explains how the sixth eclogue is interconnected with the fourth through the recall of the Golden Age on page 206, highlighting similarities and differences.

Moreover, a further relevant analysis of the fourth eclogue is
provided within chapter 7, “Eclogue 4: The voice of the author” by Brian W. Breed, which is included in Pastoral Inscriptions: Reading and Writing Virgil’s Eclogue (London: Bloomsbury Academic, 2012), 136-148. A meaningful explanation of the Golden Age is provided in this text on page 143, in which Breed clarifies the double role this reference plays. The first is literal, as Virgil refers to it, implying that “time is repeating itself,” through a societal regeneration, but also in a literary sense, since “history is repeating itself.” Virgil establishes a diachronic connection with those who wrote previously about the Golden Age. The same book contains an analysis of the sixth eclogue within the chapter 4, “Imago Voci: Echoes, Ecphrasis and the Voice as Source,” from page 74 to 94. There is also a further analysis of the fourth eclogue, which can be found in John Van Sickle, A Reading of Virgil’s Messianic Eclogue (New York: Garland, 1992). Particularly, in the first chapter “Preamble. Virgil Vates,” where Van Sickle focuses on Virgil’s ambition regarding this eclogue.


In addition to Putnam’s and Breed’s contributions regarding the sixth eclogue, see Luciano Landolfi, “Virgilio, Lucrezio e le “Laudes veris,” in Quaderni Urbanini di Cultura Classica. Volume 20, no. 2 (1985): 91-109, which explains extensively the part on the world’s origin and compares it to On the nature of things by Lucretius.

29 Theocritus described them with a detached and often ironic look.
30 For instance, Meliboeus, Tityrus, Lycidas, and Moeris.
31 “Now, Meliboeus, graft your pears, plant your vines in rows! Away, my goats! Away, once happy flock!”
Virgil, Eclogues, eclogue I, 31, lines in Latin 73-77.
32 Ibid., eclogue IX, 85, lines in Latin, 17-20.
33 “See where strife has brought our unhappy citizen! For these have we sown our fields!”
Ibid., eclogue I, 31, lines in Latin, 70-75.
Virgil uses the Latin expression, “civis miseros,” miseros meaning unfortunate, and civis meaning citizens, regardless of where they came from or where they live in the city or countryside.
34 Ibid., eclogue III, 41, lines in Latin 55-60.
35 Ibid., eclogue III, 45, lines in Latin 80-85.
36 Ibid., eclogue III, 45, lines in Latin 80-85.
37 This Triumvirate was constituted by the political and military alliance between Marco Antonio, Caesar Octavian, and Marco Emilio Lepido. 
38 Virgil was included among those. However, after Octavius's intercession, he was able to keep his lands. 
39 During this period, the Roman empire included Spain and France, as well as extending to the east unto Greece, part of Turkey and North Africa. 
40 Rome is directly mentioned only twice at the beginning of the first eclogue. 
41 “Daphnis, the wild mountains and woods tell us that even African lions moaned over your death.” 
42 Ibid., eclogue V,57, lines in Latin 36-37. 
43 “That day, methinks, when they saw me hacking Micon’s trees and tender vine shoots with a malicious pruning knife.” 
Ibid., eclogue III, 37, lines in Latin 10-13. 
44 Ibid., eclogue I, 29, line in Latin 53. 
45 Monica R. Gale, *Virgil on the nature of things: the Georgics, Lucretius, and the didactic tradition* (Cambridge: Cambridge University Press, 2000), 88-112. In this book, Monica Gale provides several examples of how this rhetorical figure works, particularly in the chapter “The god, the farmers, and the natural world.” Most of them refer to the *Georgics*. 
46 The reference to the concept of anthropomorphism and morphism has been suggested by Bruno Latour in *Facing Gaia* (Cambridge: Polity Press, 2017), 109-110. A further explanation is contained within the introduction. 
47 The figure of Tityrus embodies the efficiency of Pax Augusti, the period of peace between 27 BC and 14 AD under the first Roman Emperor, Gaius Octavius. This had allowed the development of the arts. The sound of the flute symbolizes the freedom to express oneself. For this reason, most scholars agree in attributing the voice of Virgil to Tityrus, despite his voice being present in almost all the characters. 
48 In the seventh eclogue, we can find the same principle according to which a single tree corresponds to a shepherd: a beech, holm oak or elm. Large enough to provide shade, they represent a protected place to rest, look at the cattle and play their songs. 
50 Virgil compares the dense mass of hazelnuts, the “you” with the “us”, to Tityrus’ solitary beech. 
52 “You, Tityrus, lie under the canopy of a spreading beech, wooing the woodland Muse on slender reed, but we are leaving our country’s bounds and sweet fields. We are outcasts from our country; you, Tityrus, at ease beneath the shade, teach the woods to re-echo “fair Amaryllis.”
Ibid., eclogue I, 25, lines in Latin 1-5.

53 *Patriae* means literally homeland. However, this term has a few nuances in Latin.

54 To understand the real impact of these reforms, we have to look back at the concept of *khora* and its transformation in the Latin culture. To explain the formation of the Cosmos, Plato defines the concept of *khora* as the raw matter that shapes the sensible world, which mirrors the world of ideas and its composition in numeric and geometrical figures. He explains it as a formless and obscure entity, difficult to describe, that encompasses all living beings and matter. It is the mother of all living beings. *Khora* is the place, the primal womb, where all things and initial matter are generated. All living beings arise from it, although with a great variety given by the world of ideas. It is conceived as the third intelligible realm, a pre-existing entity in-between the world of ideas, meant as the intelligible realm (the father), and the sensible realm (the son). These characteristics make *khora* an intermediate entity, intelligible as the world of ideas, but not part of it, and made to matter through the sensible world.

However, in ancient Greek culture, the concept of *khora* had multiple and diverse interpretations, such as a raw matter, outer space, and the boundaries of space. This gave rise to multiple implications for the notion of land, city, and citizenry. Although these concepts seem very distant from the primary concept, they share an invisible link with it that culturally defines them. In *The Laws*, the concept of *khora* is repurposed as a ground mother, the place where human beings are literally born, as described in the myth of the noble lie. This myth has two important consequences: firstly, it emphasizes that humans belong to the ground. Secondly, it draws a deep relationship between humans and land. This belonging to the ground defines, for the first time, the idea of an autochthonous citizen of a specific city or land. In fact, the true purpose of the myth is to claim the noble origins of some citizens to keep a sort of social order and harmony due to common city belonging. As a result, the concept of *khora* draws a thread between nature, human beings as citizens, and their cities. In the republic, the concept of *khora* grounded the importance of land on which a city was built.


In Latin culture, these associations were partially sustained by the main reforms in the expansion of the empire’s borders. According to Octavianus’ reform, land could be assigned to citizens acquired by honors of war, therefore they could come from different regions. Cicero explains in *De Legibus* that there were two types of civitas: *patriae naturae and
patriae civitatis. The first is by birth, the second is a municipality linked to the (Roman) community regulated by law. This latter does not allow for any differentiation among citizens according to their origin, language, and culture. Therefore, it is not limited to one territory.


55 “We are leaving our country’s bounds and sweet fields. We are outcasts from our country.”

Virgil, Eclogues, eclogue I, 25, lines in Latin 1-5.


57 The presence of Virgil behind the different characters is still an object of debate between scholars. However, it is quite certain that Tityrus represent Virgil.

58 Patterson, Pastoral and Ideology, Virgil to Valéry, 5.

59 Ibid., eclogue I, 29, lines in Latin 45-77.

60 Hybla is the ancient name of Ragusa-Ibla city in Sicily.

61 Ibid., eclogue I, 28-30, lines in Latin 65-70.


63 Ibid., eclogue I, 29, lines in Latin 45-48.

64 Ibid., eclogue I, 83, lines in Latin 1-5.

65 The name of Matua is hidden by the female name Galatea, and Rome by Amaryllis. The use of female names by Virgil is likely meant to express the shepherd’s affection for these cities, like a lover bringing suffering or joy.

66 “Come to me, Galatea! What pleasure lives in waves? Here is rosy spring; here, by the streams, Earth scatters her flowers of a thousand hues; here the white poplar bends over the cave, and the clinging vines weave shady bowers. Come to me; leave the wild waves to lash the shore.”

Virgil, Eclogues, eclogue II, 87, lines in Latin 39-44.

67 Ibid., eclogue II, 31, lines in Latin 5-10.

68 “For him even the laurels, even the tamarisks wept. For him, as he lay beneath a loney rock, even pine crowned Maenalus wept, and the crags of cold Lycaeus. The sheep, too, stand around.”

Ibid., eclogue X, 91, lines in Latin 11-15.


71 Regarding this divinity, researchers have hypothesized, based on some correspondences such as the caduceus stick, that the cult of Hermes may have been a syncretic fusion with the prophet Hermes Trismegistus, who
wrote the *Corpus Hermeticum*, and which greatly influenced Renaissance culture.


73 In *The Cult of Pan in Ancient Greece*, Philippe Borgeaud provides in part two of the book an extensive description of Pan’s landscape and characteristics, particularly in the chapter “Grotto and Landscape,” from pages 47-73. This description is supported by the reference to ancient texts. The following chapters deepen some of those characteristics: “Sexuality and Music,” from page 74 to 88, where Borgeaud briefly also explains the myth of Syrinx on pages 81-83, and “Fear, desire and Animality,” from page 117 to 129.


75 See *Dionysiaca* by the Greek poet Nonnos for a description of the myth of Syrinx and Pan:

“For you know how Syrinxa disregarded fiery Cythera, and what price she paid for her too-great pride and love for virginity; how she turned into a plant with reedy growth substituted for her own, when she had fled from Pan’s love, and how she still sings Pan’s desire!”


See also the *Metamorphoses* by Ovid:

“One day Pan saw her as she was coming back from Mount Lycaeus, his head wreathed with a crown of sharp pine-needles, and thus addressed her…” It remains still to tell what he said, related to how the nymph, spurning his prayers, fled through the pathless wastes until she came to Ladon’s stream flowing peacefully along his sandy banks; how here, when the water checked her further flight, she besought her sisters of the stream to change her form; and how Pan, when now he thought he had caught Syrinx, instead of her held naught but marsh reeds in his arms; and while he sighed in disappointment, the soft air stirring in the reeds gave forth a low and complaining sound. Touched by this wonder and charmed by the sweet tones, the god exclaimed: “This converse, at least, shall I have with thee.” And so the pipes, made of unequal reeds fitted together by a joining of wax, took and kept the name of the maiden.”


Additional information regarding the myth can be found in Paul Forbes Irving’s, *Metamorphosis in Greek Myths* (Oxford: Clarendon Press, 1990), who dedicates a chapter to the transformation of “Plants” from pages

77 In addition to Ferrando’s sub-chapter “Natura triplie del nomos” from pages 65 to 73, see Massimo Cacciari, Natalino Irti, *Elogio del diritto* (Milan: La nave di Teseo, 2019) for a further understanding of the concepts of dike and nomos.
79 Ibid., 66.
82 “Once introduced into physics for reasons that were initially solely practical, the distinction between primary and secondary qualities then began to proliferate in every domain. If it was indispensable for Galileo to remove all behaviours from bodies and retain only their movement, there was no reason to turn this practice into a general philosophy and still less into the politics of an Earth deprived of any possibility of being moved. What was only a convenient expedient for Galileo was transformed into a metaphysical foundation in the hands of Locke, Descartes, and their successors. It is nevertheless this unwarranted generalization that gave rise to the strange opinion that has made it possible to deanimate one sector of the world, deemed objective and inert, and to overanimate another sector, deemed to be subjective, conscious, and free. It is this strange nature distribution – which Whitehead called the bifurcation of – that weighs, four centuries later, on every interpretation of the Gaia theory. It is because Gaia has no place in the Nature/Culture schema – no more than Galileo’s Earth in motion had a place in the medieval cosmos – that we have to take some precautions in evaluating it. In a sense, it is Locke against Lovelock!” Ibid., 85.
83 From this perspective, Virgil may represent a forerunner to what contemporary “writer-activists,” as defined by Rob Nixon, are doing to address today’s ecological challenges, particularly in how they intersect with social injustices.
“In a world permeated by insidious, yet unseen or imperceptible violence, imaginative writing can help make the unapparent appear, making it accessible and tangible by humanizing drawn-out threats inaccessible to the immediate senses. Writing can challenge perceptual habits that downplay
the damage slow violence inflicts and brings into imaginative focus apprehensions that elude sensory corroboration. The narrative imaginings of writer-activists may thus offer us a different kind of witnessing: of sights unseen.”


84 To whom the possessive pronoun “your” refers is still controversial. It relates to the advent of Gaius Julius Caesar Octavian Augustus, the birth of Christ - a hypothesis dating back to the Middle Ages - or a hope guarded by the Greek Arcadia.


86 Ibid., 283.

87 Ibid., 282.

88 James George Fraser, trans., *Pausanias’s Description of Greece* (New York: Macmillan & Co., 1898).


90 (Translated by the author). Ibid., 19.

91 (Translated by the author). Ibid., 33.

92 The *Georgics* is a work made up of four books with a didactic purpose relating to the fields, arboriculture, cattle breeding, and beekeeping. Even though the intense and direct dialogue between humans and nature that characterizes the *Eclogues* is not observed in the *Georgics*, they nevertheless demonstrate a strong belief in this connection, which is fully unfolded throughout the whole work.

93 Starting from Epicurus’ thought, Lucretius equally stated that each living being is made up of an aggregate of elements according to specific modalities of time and environments, explaining that the cosmos is not conceived as a result of a divine creation, and that fewer deities interfere in human events. As a consequence of this theory, other observations such as the existence of the void, the idea of the infinite universe, and the mortality of the soul, have been defined.


95 “Of Earth the universal mother I will sing, the firmly-grounded, the eldest, who nourishes everything there is on the land, both all that moves on the holy land and in the sea and all that flies: they are nourished from your bounty. From you they become fertile in children and in crops, mistress, and it depends on you to give livelihood or take it away from mortal men. He is fortunate whom your heart favors and privileges, and everything is his in abundance. His plowland is weighed down with its vital produce, in the fields he is prosperous with livestock, and his house is filled with
commodities. Such men are lords in communities where law and order prevail and the women are fair, and much fortune and wealth attend them; their sons exult in youthful vigor and good cheer, and their girls in flower-decked.”


or Euripides:
“Earth, greatest one, and Aether, realm of Zeus—he the begetter of humankind and gods, while she, receiving his damp moisture-spreading drops, bears mortals, bears vegetation and the families of beasts, and so is rightly considered mother of all. Those things that were born from earth return to earth, and those that grew from ethereal seed go back to the heavenly region. None of those things that come into being perishes, but one is separated from another and exhibits a different form.”


The image described by Aeschylus in this text is the closest to Virgil’s.
“The holy heaven yearns to wound the earth, and yearning layeth hold on the earth to join in wedlock; the rain, fallen from the amorous heaven, impregnates the earth, and it bringeth forth for mankind the food of flocks and herds and Demeter’s gifts; and from that moist marriage-rite the woods put on their bloom. Of all these things I am the cause.”


96 In this book, Lucretius extensively describes how life on earth developed after the first stage of the formation of the Cosmos:
“For in plain fact firstly all the bodies of earth, those of being heavy and entangled, came together in the earth to the midst and all took the lowest place; and the more entangled they came together, the more they squeezed out those particles which could make sea, squeezing stars, sun, and moon and the walls of the great water, world; for these were all made of seeds more smooth and more round and far smaller elements than the earth.”


98 “But because she must have some limit to her but her bearing, she ceased, like a woman worn out by old came to the age. For time changes the nature of the whole world, bearing, and one state of things must pass
into another, and nothing remains as it was all things move, all are changed by nature and compelled to alter. For one thing, crumbles and grows faint and weak with age, another grows up and comes forth from contempt. So therefore, time changes the nature of the whole and cannot world, and one state of the earth gives place to what she another, so that what she bore she cannot, but can bear what she did not bear before.”


99 “To say further that for men’s sake they had the will to prepare the glorious structure of the world, (...) and to think that it will be everlasting and immortal” Martin Ferguson Smith, *Lucretius, On the Nature of things*, 391. Lucretius, book V, lines in Latin 158-160.

And “Therefore mankind labor always in vain and to no purpose, consuming its days in empty cares, plainly because it does not know the limit of possession, and how far it is ever possible for real pleasure to grow; and this little by little has carried life out into the deep sea, and has stirred up from the bottom the great billows of war.”


101 Serres is excellent at comparing this perception of time with the current one. “Now living only indoors, immersed only in passing time and not out in the weather, our contemporaries, packed into cities, use neither shovel nor oar; worse yet, they’ve never even seen them. Indifferent to the climate, except during their vacations when they rediscover the world in a clumsy, Arcadian way, they naively pollute what they don’t know, which rarely hurts them and never concerns them.”


102 The preface that opens the fifth book is very clear. By praising the contribution of Epicurus, Lucretius reminds the reader of his purpose: to purify the human soul and to identify erroneous beliefs that lead to human suffering. “Who is able with mighty mind to build a song worthy of the majesty of nature and these discoveries? Or who is so potent in speech as to devise praises fit for his merits, who by his own intellect winning and gaining such treasures, has left them to us? None will be found, I think, of the sons of mortal men. For if we must speak as this very majesty of nature now known to us demands, he was a god, noble Memmius, a god he was, who first discovered that reasoned plan of life which is now called Wisdom, who by his skill brought life out of those tempestuous billows and that deep darkness and settled it in such a calm and in light so clear.”


103 Gian Biagio Conte, Virgil’s scholar, brilliantly explains that: “If
Lucretius tends to lead back the whole reality of things, and with the human culture itself, to nature, Virgil’s effort goes in the opposite direction: as far as he can, he favors the transformation of nature into the culture of human beings.” (Translated by the author)


104 The concept of *anima mundi* is explained by Plato in the *Timaeus*, where he draws the origin of the *Cosmos* as the origin of human beings. They are shaped by Demiurge's action, “the good architect” gifted with craft skills, who copies the proprieties of the world of ideas, and molds the *Khora* (raw matter), arranging it through the use of geometrical figures and numeric proportions, instilling it with a soul, *anima mundi*. This latter principle defines the *Cosmos* as a living organism, endowed with a soul and intelligence.

It is meant as a living source that guarantees the understanding of the existence of the endless variety of living and not living entities and, at the same time, of a whole entity, characterized by one inner and common essence based on numerical qualities. What governs the relationship between the concept of the *Cosmos*, as a whole and its singular elements, are the inner bonds called *sympathèia*, a term originating in Stoic thought. Thanks to the concept of *anima mundi* and its proprieties, the analogy between the microcosm of each living being and the macrocosm of the Cosmos has been definitively established, becoming an essential harmonic element.

The concept of *anima mundi* comes to be reconsidered by Plotinus in the 3rd century A.D. in his main work, *Ennead*. Thanks to his work, the concept of *anima mundi* was rediscovered by Renaissance scholars. Plotinus defined it as the third ontological entity related to the One (the cause of the being of anything) and the Intellect, with a deeper divine meaning in comparison to Plato’s interpretation. Within Plotinus’ thought, *anima mundi* is the ontological entity that creates the tangible world, donating to each part of its order and life. Due to its natural closeness to the Intellect, it is capable of spreading while remaining undivided. In this sense, we can call it nature in terms of natural and rational order and inner essence. Differently from the intellect, the second ontological entity within his philosophy, the *anima mundi* has only a creative, but non-cognitive ability. Nature meant as a physical realm is conceived as the last and most tangible part of *anima mundi*, like a sort of footprint, or vehicle for sensitive and intellectual life. Introducing the concept of *anima mundi*, Plotinus also is able to define the universe as a living organism, claiming a mutual exchange between each singular living element and the whole.

Eric Schliesser, ed. *Sympathy: a history* (New York: Oxford University
106 Ibid., book III, 213, lines in Latin 525-528.
107 Ibid., book II, 139, line in Latin 49.
108 This explains the purpose of the entire book. Specifically, the second book is carefully devoted to identifying the specific characteristics of the soil and its orientation to the sun, suggesting the best type of plants to grow and the appropriate season for planting them.
111 Francesco Petrarch was an Italian poet, writer, and philosopher. He was born in 1304 in Arezzo (Italy) and died in 1374 in Arquà (Italy). Giovanni Boccaccio was an Italian poet, and writer. He was born in 1313 in Certaldo (Italy) and died in 1375 in Certaldo (Italy). Leon Battista Alberti was an Italian architect, writer, mathematician, humanist. He was born in 1404 in Genoa (Italy) and died in 1472 in Rome (Italy). Cristoforo Landino was an Italian poet, writer and philosopher. He was born in 1424 in Pratovecchio (Italy) and died in 1498 in Borgo alla Collina (Italy). Jacopo Sannazaro was an Italian poet and writer. He was born in 1458 in Naples (Italy) and died in 1530 in Naples.
113 Francesco Petrarch wrote this work between 1347 and 1351.
114 “They (Eclogues) afford the reader the brightest and most intimate glimpses of Dante’s last years, of his pleasant intercourse with his friends and his growing fame. On the side of language, they reveal that strong prepossession which for centuries haunted many of the best minds of Europe that Latin was the only language for great modern literature and the moment when Dante first vindicated the superiority of modern languages for the modern world. On the side of literary history, they show him Dante restoring the ancient pastoral after a millennium of neglect and initiating its long and distinguished career in modern times. And on this side of poetry, they offer the strange ideal charms of pastoral created by the genius which in the same years was inspiring the Paradiso.”
115 Annabel Patterson, *Pastoral and Ideology*, *Virgil to Valéry*, 45.
116 Karlheinz Stierle, *Petrarcas Landschaften: zur Geschichte ästhetischer*
Landschaft Erfahrung (Krefeld: Scherpe, 1979).


119 He was a philosopher and theologian. He was born c. 1100, Conches, died 1154.

120 The Christian medieval philosophical thought strongly conceived nature as a complete and perfect realm fully determined by the voluntary act of God, included in a fixed ontological hierarchy, and therefore, was deprived both of its own autonomy and its own generative principle, rediscovered by the studies of classical philosophy and literature.

121 The text was written around 1160. Alain de Lille, *The Complaint of Nature*, trans. Douglas M. Moffat (New York: H. Holt and Co., 1908). Although the title was translated in English as complain, *Planctu* means a weeping due to deep sadness in Latin, often related to bereavement.

122 Ibid., 6.

123 Ibid., 3.

124 Ibid., 5.

125 “He is both predicate and subject, he becomes likewise of two declensions, he pushes the laws of grammar too far. He, though made by Nature’s skill, barbarously denies that he is a man. Art does not please him, but rather artifice; even that artificiality cannot be called metaphor.” Ibid., 3.

126 Ibid., 33.

127 Ibid., 43.

128 Ibid., 43.

129 As we can see, this quite uncommon argument will be relevant for Leon Battista Alberti’s idea of Nature.


131 This work was written around 1184.

132 Both works were written around 1440.

133 *On the Art of Building in Ten Books* was published in 1485.

134 As already explained within the introduction, speaking about Enlightenment Naturalism, in the essay, “Reason’s Adventures: Naturalism and the City in the Century of the Enlightenment,” Tafuri briefly draws out and analyses connections to the “Rhetorical Arcadian Naturalism”. On the one hand, Enlightenment Naturalism is explained through the connections between the urban theories of Marc-Antoine Laugier and the empiricist and rationalist ideas of nature, describing how European cities changed their inner fabric, open spaces, and borders, as well as the relationship between
countryside and city. On the other hand, Tafuri does not provide a definition of Arcadian Naturalism, opening to the possibility of further investigation. Manfredo Tafuri, “Reason’s Adventures: Naturalism and the City in the Century of the Enlightenment,” In Architecture and utopia: design and capitalist development (Cambridge: MIT Press, 1976), 1-41.
2. Leon Battista Alberti: from Theogenius to On the Art of Building in Ten Books.
2.1 Theogenius: exploring human nature.

Even though *Theogenius* by Alberti is not written metrically in the same way as Virgil’s *Eclogues*, since it is divided into two books, it can, nevertheless, still be associated with the Arcadian genre.¹ The encounter between Theogenius and Microtirus immediately demonstrates that the work bears a strong resemblance to Virgil.

Theogenius is sitting on the grass, intent on writing, when Microtirus sees and invites him to sit under the beech trees, described as tall “wide and magnificent temples and theatres,” under which the sun does not reach “the perfect colours of various flowers intertwined with green shine in the shade; and wherever the aura moves towards you, from there, one can smell sweetness.”² Alberti does not explicitly indicate the location of this pair. However, the description of the vegetation and the fact that they refer to the city as a place outside of the scene demonstrate that they are not in a garden but in the countryside near the forest.

As with Virgil, and even before with the Greek poet, Alcmane, the contiguity between plants and animals is an essential theme of the writing. Again, birds are the animals that seem to reveal this significance.³

“They come with new songs that praise the skies for greeting me! And this bird here near a silvery and very pure fountain, is the witness and arbiter in part of my studies. It always comes to cheer me up, and as much as it is in it, it wraps itself cuddling around me; now hiding among the foliage of these very fresh and
graceful grasses, now with his waves rising and singing sweetly beautifully, he bows and greets me, now happy with a lot of calm he opens up to me and lets me contemplate and mirror myself in him.”

Birds are observed through their movements and song. More intricately than Virgil’s description of birds in Georgics, which were observed with wonder but kept at a distance, Theogenius’ birds become an agential collaborative actant. There is no guessing or wondering about their behaviour, just the pleasure of accepting their presence and loving support.

Therefore, from reading this initial part, one can be certain that Theogenius echoes Virgil’s Arcadian atmosphere: the surrounding landscape is described as a source of wonder and pleasure which mirrors Theogenius’ movements, thoughts, and feelings. As in Virgil, this suggests a connection between human nature and the natural world. Both are conceived as one entity, inextricably linked to each other. In Alberti’s thoughts, however, this awareness is so prominent that his dialogue with nature extends far beyond admiration or individual comfort.

However, although Alberti addresses similar topics to Virgil, including the contiguity between humans and non-humans, the risk to this relation, and the connections between inner and outer realms, these are reshaped by the addition of supplementary reflections and themes. Alberti engages in a severe warning to both his contemporaries and future generations regarding the attitude of human beings’ inner nature and
its propensity to destroy its precious bonds with the natural world, which results in both tangible and intangible damage.

It is within this framework that the concepts of fortune and virtue, inherited by Petrarch and other Italian thinkers such as Coluccio Salutati, Leonardo Bruni, and Poggio Bracciolini - contemporary and well-known intellectuals - come together to augment and further articulate Alberti’s reflections and concerns.⁶

In this serene and harmonious setting, the two men, Theogenius and Microtirus, are not shepherds, and no injustice afflicts them directly. They start to engage in a dialogue about the nature of human beings, recalling the argument between Genipratus and Tichipedus: Genipratus was a wise, older man who lived in exile in the woods and cultivated a vegetable garden to feed himself, whilst Tichipedus was an arrogant, wealthy landowner from a nearby city who was struck by bad fortune.⁷ Like Virgil, Alberti uses the contrast between the countryside and the city metaphorically, but not literally, to emphasise the differences between ethical values: fortune and virtue follow along from justice and peace. Through its visual and poetic appeal, the countryside immediately conveys the validity of natural laws to the reader and the possibility of co-existence between humans and non-humans. Contrary to this, greed, arrogance, and corruption, embodied by the image of the city, become representative of social injustice and environmental imbalance.

Looking at the unfortunate fate of Tichipedus, Alberti’s interlocutors explore the role of fortune. The focus on de-
fining the effects of injustice and the role of a fortunate individual contrasts with Virgil, who never specifically mentions ‘fortune’. The reflection on the concept of fortune introduces a crucial question that is carried across the topics approached by Alberti’s text; “what makes a human being the happiest?” if not to be rich, charming, and loved among his citizens, Tichipedus asks. Whilst asking this, Tichipedus is described as laughing, looking at the calloused hands of Genipratus as a sign of contempt. As Genipratus argues, fortune is mutational and should not be defined by material possessions, but instead by the knowledge and kindness derived from books, as well as by the use of “the sincere intellect and the whole reason.” As a conclusion to his thoughts, Genipratus states: “Therefore, not the abundance of things, as much as modesty and restraint, makes us happy.”

At this point, reflecting Lucretius and Plinius’s teachings, Alberti, through the words of Theogenius, reflects on the fact that fortune is purely a human concept that is artificially set up to excuse us from taking responsibility for our fragility. The concept of fortune, in fact, does not affect nature and other living beings, in turn suggesting a relevant gap between the reciprocal inner natures of humans and non-humans. Although nature has similar and regular fluctuations - day and night, warm and cold, as well as sudden phenomena like earthquakes - these phenomena are regulated by natural laws that never change and are cyclically repeated. In contrast to this: human beings are the most restless and impatient animals.” “Omicciuoli,” a disparaging term, is used by Alberti
to describe the small stature and fragility of individuals who are greedy and cowardly, which makes their nature weak and more dangerous than natural phenomena. Ignoring this inner fragility and their mortality, human beings are the cause of their own greatest misfortune. Alberti, through Theogenius’ words, firmly claims that animals are not affected by greed, eating only as much as they need and being happy with what they are.

Blaming fortune, and not their stupidity, human beings are never happy or satisfied with the present state of things, always looking for new resources and experiences. It is these expectations that make human beings volatile. Their unstable inner nature leads them to break natural laws and ecological balances, searching for new places, ploughing unknown lands and seas, and demonstrating little consideration for their environment and the other living beings that inhabit it:

“This accusation seems to echo Pliny; although the latter regards nature as a resource for human beings, defining a hierarchy between living creatures and emphasising human powers over nature, he also briefly describes how human weakness and the promise of fortune leads them to danger-
ously exceed their limits, extract from their surroundings, and become a cause of harm. ¹⁴

“We dye even the rivers and the elemental substances of Nature and turn the very means of life into a bane. Nor is it possible for us to suppose that animals do not know of these things; for we have indicated the preparations that they make to guard against encounters with serpents and the remedies that they have devised to employ after the battle. Nor does any creature save man fight with poison borrowed from another. Let us, therefore, confess our guilt, we who are not content even with natural products, inasmuch as how far more numerous are the varieties of them made by the human hand!”¹⁵

In explicitly illustrating the link between the quality of humans’ inner nature and environmental effects - between humans’ behaviour and their transformative attitude towards nature - Alberti captures the essence of the dialectical correlation between nature and human beings and the potential danger of disrupting and disconnecting the way nature and culture interact. He was a pioneer in recognizing, for example, the potential of advancing tools and machines, but at the same time, the danger of using them to further establish the hierarchy of culture over nature.

To emphasise the relevance of Alberti’s contribution, Garin has highlighted its distance from the legacy of Latin and Greek thinkers.¹⁶ This has been taken for granted by many scholars over the years, such as Cicero, from who Alberti borrowed the concept of *concinnitas* as presented in his *Orator*.¹⁷

When reading Cicero’s *Nature of the Gods*, a hierarchical and brutal conception of the relationship between human and non-human beings becomes explicit.¹⁸ In this work,
three intellectuals - an epicurean, Velleio, a stoic, Balbo, and Cotta who represents Cicero’s voice - debate the nature of the Gods, their essence, and their relationship to living beings and the world. The dialogue follows Cicero’s well-known rhetorical technique, which was based on logical reasoning and effective use of Latin. It slowly leads the reader to reject the first and second theories offered by the intellectuals, coming to affirm the third theory as the ultimate truth. In this way, after rejecting Velleio’s arguments in the second book, Cicero gives a passionate description in Balbo’s words of the Cosmos, or *Mundus* in Latin. From the outside, the Cosmos looks perfect: its mountains, woods, grass and cultivated fields, underground caves containing gold and marble buried beneath the ground, and its seas and sky, are all populated by an interconnected network of living beings. Free birds shake trees and pastures around the fields, as well as human beings that look after this environment, building villages and cities.\(^{19}\) However, this represents the result of divine wisdom delivered through intelligence and knowledge, which asserts harmony between all the elements on the terms of a hierarchical system that privileges human beings. According to Cicero, therefore, humans have the right to impose their wishes on the world and its non-human inhabitants. Humans are entitled to grow, hunt, and use technologies to their sole advantage.\(^{20}\)

“Domitu nostro quadripedum vectiones:” the term *Domitu* is often repeated in Cicero’s text and represents the imposition of a masculine strength that does more than merely tame the world. Humans are permitted to mine metals from the depths
of the earth and mountains, as they naturally govern the land, seas, and open territories, as well as the geographical features, animals, and plants therein. Balbo asks rhetorically, what is the animal’s function? Sheep, for instance, provide wool for human beings to wear, and without whom they cannot be fed. Human status is acquired as a natural consequence of possessing the same divine wisdom. This gives human beings the full right to subjugate the world: “Likewise, the entire command of the commodities produced on land is vested in mankind.”

How different Alberti’s thinking appears in the Theogenius! Against Cicero’s sense, Alberti’s point of view is closer to Pliny’s thought. Italo Calvino, within his preface of The Natural History, explains that Pliny was a poet and philosopher with a passion for the Cosmos and all its natural phenomena. On the one hand, Pliny was an obsessive collector of data, possessing numerous specimens of plants and animals, which he accumulated with a scientific and rigorous approach. On the other hand, Pliny also displays a deep sense of wonder and respect for nature, which is essential in his development of an ethical perspective towards the natural realm, as evidenced by his praise of the moon. As the reader will see, the combination of a poetic approach along with scientific investigation is a recurrent attitude among the authors investigated in this research and is representative of the Arcadian discourse.

The next section returns to the question, “what makes
a human being the happiest?” If the concept of fortune mis-leads us towards a miserable solitary destiny governed primarily by the impermanence of events, what alternative is left? Through Theogenius’ words, Alberti seeks to identify a purpose that transcends a passive acceptance of the only virtuous possibility being spiritual and contemplative acceptance of the idea that “nothing should bother” our inner self.24

Microtirus is unsatisfied with Theogenius’ suggestion, asking how injustices can be overcome, even when we try to apply a virtuous attitude. As Theogenius specifies, a responsible citizen should act in a virtuous manner to prevent injustices from escalating. Referring to the connection above, by extension one could also say environmental imbalances. Besides weakening the individual, injustices also weaken a homeland and its constitutional laws. It is even more serious if this happens: “There are strict rules of law we need to obey (...) we must share our possessions, goods, and fortunes (...) We don’t live just for ourselves. Part of our goods is claimed by the country, part by our family, and part by our close friends.” 25 By adding this component, Alberti extends the connection between inner human nature and environmental and social effects, transforming an individual concern to account for the interests of all citizens and their environments. Individuals should develop a virtuous idea of citizenship and a culture of ethics that affects the city and its political, social, and spatial structure.

By providing numerous examples of countries and cities, prior to Alberti, Bracciolini set out the connections be-
tween virtue and good citizenship. Bracciolini demonstrates that although nobleness (virtue) is independent of external influences (fortune), as well as political and economic factors, and geographical locations, it does not exclusively concern the individual’s contemplative life but can also be nurtured to contribute to civic and social development. Bracciolini explains that nobleness in most Italian cities was predominately conferred through hereditary lineage, passed from fathers to sons, regardless of an individual’s merits. However, in cities driven by commercial exchange, such as Venice, the principle of nobleness extended beyond family ties. In Venice, nobility and virtuosity, Bracciolini argues, were embodied in those contributing to the city’s governance. In his book *Patricians and Popolani: The Social Foundations of the Venetian Renaissance State*, Dennis Romano confirms this peculiarity of Venice, stating that during the early Renaissance cohesion, harmony, and the city’s upkeep “were not determined by any one factor such as wealth or legal status. Instead, they tended to be freewheeling.”

Looking to Florence, Leonardo Bruni also provides some examples of how virtue can affect the city and its citizens. *In Praise of Florence*, written around 1400, describes the virtue of the city in not only in its ability to defend itself, but also in the wisdom of its original citizens who chose its suited geographical location: in a middle position, surrounded by hills, and at just the right height from the sea. The beauty of Florence’s public and private buildings, its streets within and outside the city, as well as its overall cleanliness were not
just the result of favourable conditions but also of the care shown by its “industrious” citizens. In this perspective, two elements seem particularly relevant: the correspondence between noble citizens and the material beauty of the city. For Bruni, Florence’s spaces, and how buildings relate to their surroundings, suggest a sort of virtuous aesthetic. The strong awareness of the invisible bonds connecting humans and their environment underpins care as virtuous behaviour.

Furthermore, the nobleness associated with Florence by Bruni is shown by its generosity towards exiles from other cities, who can be considered equal citizens: “There is not one man in the whole of Italy who cannot be assured to have two mother countries, the place he comes from and Florence. She is the common home and the safe asylum of Italy to which all may flee for protection if necessary.” Bruni’s use of the word ‘common’ when describing the city’s openness suggests a broader conception of civic values which emphasizes the importance of humanity over the distinction of political boundaries. In this sense, Bruni anticipates many themes that appear in Alberti’s text in the prologue of his treatise on architecture.

Nevertheless, Bruni does not entirely explain which principles or tools can be used to design a city based on this concept of virtue. In contrast, this concern is exactly what Alberti pursued; his reflections within Theogenius outline the intent and interests he would sustain throughout his life and career, culminating in the publication of On the Art of Building in Ten Books.
2.2 Nature(s). Two symmetrical views of nature in Alberti’s thought.

In anchoring Alberti’s text to the Arcadian discourse and reflecting extensively on the ethical issues it raises, Theogenius may also serve as an explanation of Alberti’s “symmetrical understanding of nature.”32 The first deals with the notion of nature as an expression of the inner vitality of living beings and their interactions, understood as an all-encompassing immanent realm, which, therefore, is often a trigger of ethical reflections. The second concept deals with the notion of nature as a transcendent mathematical and geometrical system that can serve as a model, primarily represented as an external nature. These two understandings overlap across Alberti’s work and are synthesised in the content of On the Art of Building in Ten Books. They became the ethical and cultural premise of Alberti’s theory of architecture.

This symmetrical perception has often been seen by scholars as an ambiguous and controversial aspect of Alberti’s work. They have frequently dismissed these contrasting ideas in his writings as immature and incompletely formulated. Alberti’s ambiguity may be explained by a challenging attempt at cultural and intellectual mediation in order to understand and address the disruptive effects caused by the disconnection of culture and nature, already predicted within Theogenius. In this sense, Eugenio Garin’s contribution is significant since he unties Alberti’s thoughts from their association with his
figure as an outdated Renaissance scholar, revealing instead their relevance to contemporary critical discourses. This also enables current debates to reintroduce a complexity of humanistic thought. 

Nevertheless, it is possible to recognise some of Alberti’s works in which the first understanding of nature (as an all-encompassing immanent realm) and its correlated associations appear dominant over the other. For instance, in addition to Theogenius, Della Familia, Intercenales, Apologhi are united by a common purpose: to investigate the inner essence of living beings, comprising of virtues and faults, as well as their connections with environments and social structures, ranging from the domestic to the political. In these works, Alberti does not focus on practical transformations, but on the underlying purpose of human beings, which indirectly influences and affects them. Through this attitude, he shows himself to be aware of the complexity of relationships involving not only humans but other organisms as well. Particularly within Intercenales and Apologhi, Alberti utilises animals, plants, and less frequently, ordinary objects, as central characters that steer the narrative and express his ethical concerns.

One of his most famous texts is Musca (The Fly). This insect is described as thrifty, always content, and loyal. It does not harm other living organisms. In this sense, it is a peaceful insect, as opposed to a locust, which destroys entire fields in its wake, or an ant, which destroys entire cities. Alberti aims to highlight the importance of natural laws and knowledge as the foundation for a peaceful society, aware of
the connections that sustain its parts.

In another story, *Lacus* (The Lake), he presents an extended metaphor for society. He tells the story of a lake where fish and frogs live in harmony until they are destroyed by changing the laws and rules they previously followed. Through this simple metaphor, Alberti shows a micro-environment and its ecological functioning, imparting an ethical lesson regarding good governance and the role of good citizens.

According to David Marsh, Alberti was able to maintain Aesop’s tradition of communicating wisdom using animals and plants, creating a bridge between the natural world and a humanistic concern for ethics and politics.

Instead, Rosario Contarino, drawing a comparison between Alberti and the medieval *bestiary*, provides an additional and interesting contribution. While in the second, animals have merely an allegorical role and are used as devices to convey ethical content, in Alberti’s works the perspective on animals is extended by looking at the natural realm with an almost scientific approach, which transposes the human realm onto it. Alberti first selects a suitable species to represent a specific human behaviour, and consequently, he precisely describes their characteristics, movements, and behaviours as expressing ethical concerns. As a result, animals and other living beings are not objectified but, instead, provided their own autonomy and value.

The approach highlighted by Contarino suggests that, already in these works, Alberti was summarising two sides
of his concept of nature. On the one hand, he provides accurate and almost scientific insight. On the other hand, by using Arcadian poems, tales, and dialogues often populated by animals, plants, etc. he reveals his affections and spiritual connection with nature.

Ultimately, the arguments expressed within *Theogenius* are taken up at the beginning of the second of *On the Art of Building in Ten Books*, which delves into architectural materials. However, Alberti’s scope extends beyond technical or theoretical descriptions of architectural components, but rather integrates this content within broader ethical considerations. This is illustrated by the premise:

“First, nothing should be attempted that lies beyond human capacity, nor anything undertaken that might immediately come into conflict with Nature. For so great is Nature’s strength of her that, although on occasion some huge obstacle may obstruct her, or some barrier divert her, she will always overcome and destroy any opposition or impediment; and any stubbornness, as it were, displayed against her, will eventually be overthrown and destroyed by her continual and persistent onslaught. How many examples are there to be seen or read about the failure of mankind’s work to survive, simply because it has come into conflict with Nature? (...) Who would not mock someone who intends to ride over the sea on a bridge of ships, and despise him not so much for his arrogance as for his folly? The port of Claudius, below Ostia, or that of Hadrian, near Terracina, are works that might otherwise have been expected to last forever; yet now we see them in ruins, their mouths long since choked with sand, their harbors silted up, while the sea with its incessant wrestling continues its onslaught and daily increases its advantage. And what would happen, do you imagine, to any attempt to hold back and restrain the force of cascading water, or the weight of tumbling boulders? We ought to be careful, then, to avoid any undertaking that is not in complete accordance with the laws of Nature.40

Due to human frailty, it is often the inclinations of greed and foolishness that steer individuals in misguided di-
reactions and actions. As a result, they exceed their capabilities and fail to apply their wisdom, thereby contributing to disharmony. In a more stringent manner than *Theogenius*, Alberti draws an ethical and political boundary that should not be crossed – a point where nature becomes dangerous not because of its inherent characteristics, but due to the senseless challenges brought by humans. He boldly insists that human actions contrary to nature, whether in its material and morphological physicality or adherence to its harmonious internal laws, should be avoided. He articulates the arguments adopted in *Theogenius*, here, proposing a direct relationship between human attitudes and the modifications and alterations made to a territory through architecture. Regardless of one’s level of knowledge or expertise, all human-land interactions should be characterized by virtuous intentions, free of greed and stupidity.

Alberti goes a step further, using his resolute statement against these behaviours as the basis for an additional reflection. Not only do such deviant attitudes disrupt nature, but they also significantly impact what is deemed as “appropriate” architecture. Aside from being modest and suitable for its function, appropriate architecture should be economically balanced in its use of material resources. It should also be socially useful and consider its future durability for generations to come. By establishing this correlation between human attitudes and architectural artefacts, Alberti proposes that the latter possesses a kind of moral value, explaining the treaty’s primary theme: the civic role of architecture.
The second dimension of nature can be seen in other works which primarily concern its external appearance, its lines, shapes, proportions, and its mathematical and geometrical essence. This is the case with the art treatises, *On Painting*, *On Sculpture*, *Delineation of the city of Rome*, and *Ludi Mathematici*. In contrast to the previous works, these cannot be understood without considering the legacy of Plato’s thought, particularly in *Timaeus*. His influence contributed to shaping this dimension that emphasises nature as a rational and harmonious realm which is governed by numerical and geometrical laws defining its transcendental essence. In this sense, its numerical structure opens up the possibility of investigating reality through the invention of tools and machines, enabling a new scientific approach to the world. In addition to the rationality of numbers and geometric shapes observed by Demiurge, Plato’s Cosmos is characterized by soul and beauty, making it a living organism, and thus resulting in another component, *khora*, which is understood as “the receptacle and in a manner the nurse, of all generations.”

*Khora* is conceived as raw material and an obscure entity that is difficult to describe. It encompasses all living beings and is the mother of all living organisms; it is the place where all things and their primal matter are generated. In this sense, Plato’s cosmology bears the same ambivalence and richness detected in Alberti’s thoughts. It should therefore come as no surprise that these works contain references to the first understanding of nature and vice versa.

Before completing *On the Art of Building in Ten*
Books, Alberti had already explored how other forms of art, such as painting and sculpture, could be reformed. *On Painting, On Sculpture, and Delineation of the city of Rome* represent the initial iterations of his investigations. Alberti integrated theoretical and practical contributions, defining new artistic principles, for instance, based on the properties of lines as a fundamental element for the design of artworks and buildings. He used measurement tools to describe the human body, the ground, and the space of the city, as well as in the design of paintings, sculptures, and eventually buildings. He likewise considered mathematical geometry, more than any other discipline, to be the foundation for painting, sculpture, and architecture. He dedicates *On Painting*’s first chapter to this thought entirely: “I want the painter, as far as he is able, to be learned in all the liberal arts, but I wish him above all to have a good knowledge of geometry.” 48 Geometry’s immediate application in charting physical objects within space established it as a tool for comprehending and implementing practical designs using perspective.

*On Painting* traces the invention of the perspective, which Brunelleschi had already codified, establishing it as a new tool for knowledge and transformation of the world. Visual rays that intersect a surface become the basis for a new way of looking at the world. Together, grids, lines, and points of intersection precisely define and measure the ultimate proportions between the human point of view and the other elements included in the perspective frame. In this way, perspective is seen as the most important tool for encapsulating
reality within a geometric layout which, from its initial de-
scriptive purpose by Alberti, comes to influence the designs
of the paintings, interior spaces, buildings, and city.

*On Sculpture*, published several years later, confirms
Alberti’s interest in geometry as a fundamental tool to under-
stand the proportions of the human body, by measuring the
distance between parts and coding them using coordinates wi-
thin the space. While perspective still belongs to the abstract
realm of drawing, *On Sculpture* sets out new tools: the *norm-
mae* (squares) and *exempeda* (ruler), used to record thickness,
widths, and lengths; and the *finitiorum*, used to record curves
and body variations, such as movements.49 (FIG.1 and 1a) 50

This achievement is used in other treatises, such as
*Delineation of the city of Rome*, where Alberti explains sim-
ilar tools that make use of geometry, used on this occasion to
derscribe Rome. Through a numeric system of coordinates, a
sort of parametrical precursor, as suggested by Mario Carpo,
Alberti draws a series of connecting points and lines on the
ground on which to create an accurate map; all the parts of
an urban structure, its walls, gates, rivers, and monuments,
are presented in their totality rather than as sequenced or sin-
gle buildings. Alberti explains precisely how this procedure
works:

“Using mathematical instruments, I have recorded as carefully
as I could the passage and the lineaments of the wall, the river,
and the streets of the city of Rome, as well as the sites and loca-
tions of the temples, public works, gates, and commemorative
monuments and the outlines of the hills, not to mention the area,
which is occupied by habitable buildings, all as we know them to
be in our time. Furthermore, I have invented a method by which anyone, even a man endowed with only an average intellect, may make both exceptionally easily, and also very accurately, depic- tions on any surface, however large. It was some intellectuals, friends of mine, who moved me to do this, and I thought it good to assist their studies.”51

This procedure leads to the definition of principles similar to those Alberti suggests with painting and sculpture; *lineamenta, collocatio*, and *situs* are crucial for mapping the ground, and later on, planning new parts of the city.52 It is for this reason that Alberti included these compositional principles in the tenth book of *On the Art of Building in Ten Books*, along with other tools, that were essential in the foundational acts of constructing a city: tunnelling, digging, drying, and channelling the water by determining the appropriate heights and levels of the ground, conveying it “along a watercourse or forcing it down the pipe.” 53 (FIG.1b)

According to Alberti, there are three methods for calculating the correct level to convey water, depending on how flat and clear the ground is as well as how accurately the slope line for the water flow must be calculated. When the ground is sufficiently flat, levels can be determined by a fixed staff, markers, and the tool held by the land surveyor through which the “sights, points,” are taken.54 (FIG. 2)

Complicating the task, Alberti goes on to explain two calculations for responding to cases when the topography of the land is more complex. First, Alberti suggests measuring the level “from the sluice,” or source, of the water, along with measuring the level “from the outlet,” to the final point where
the water will arrive. This follows the same procedure as explained above, which for this reason results in less accuracy. The second calculation presented appears more innovative, since it refers to the horizon, as a tool already developed for sculpture and cartography. (FIG.3) Alberti presents this method enthusiastically, as completely trustworthy:55

“(…) a circle ten feet in diameter: the circle is called horizon. In the center of the circle set a staff. So that it stands vertical. This done, the director of the works will walk around the outside of the circle until he finds the position where his line of sight, when we are looking toward one of the two ends of the channel aligns itself with the base of the staff positioned in the middle. Having established and marked this spot on the circular horizon, the workman traces this line of direction onto the circle, so that it cuts the circumference on either side. This line will obviously be the diameter of that circle, because it runs straight through the center, cutting both sides of the circumference. If this is extended in a straight line away from the point of vision, and one end meets the sluice and the other the outlet, its path will show that the course of the water will be straight; if it does not meet them, but the diameter aligned with the sluice has a different direction from the diameter aligned with the outlet, then the mutual intersection of their lines at the staff in the center will show the difference in their directions.”56

Alberti comes to conclude his explanation by taking the opportunity to further elaborate on how his inventions are also applied to “marking and drawing maps of a city or province,” referring to his previous work, Delineation of the city of Rome. It is evident from this circularity of references that Alberti understood his architectural treatise as itself a tool, which would combine the theoretical and practical reflections of his entire life.57
FIG. 1 and 1a. Leon Battista Alberti, drawing of sculptor’s tools, 1726.
FIG. 1b Leon Battista Alberti, water sources search method, 1726.
FIG. 2 Leon Battista Alberti, method used to measure the height of the ground when it is flat and clear, 1726.
FIG. 3 Leon Battista Alberti, method used to measure the height of the ground when it is not flat and clear through the application of the horizon, 1726.
However, in the chapter that follows this, Alberti includes, even if briefly, a contribution on how to construct effective riverbanks based on the differences between streams and currents. This, interestingly, extends the applications of tools described above to solutions based on informal technological cultures, which is a rare topic in theoretical works. He suggests materials that can be used, such as stone, brick, or mud, and the use of gradual slopes instead of straight vertical lines and the use of vegetation as a natural riverbank, becoming quite specific:

“When building the bank, some prefer to turf it over with grass cut from meadows; I too am in favour of this, because the intertwining roots bind the material, provided it is packed together tightly. Indeed, the entire composition of the bank, and especially the part washed by the water, ought to be reinforced to an impenetrable and imperishable compactness. Some would plat the bank with sprigs of osier; this is certainly strong, but of a temporary nature. The sprigs rot easily, allowing the water to seep in where they have decayed, and to penetrate further, until it has increased the size of its passage and widened its bed. But there is less danger of this if green sprigs are used. Some plant willow, elder, poplar, and other hydrophilic trees, in tight rows along the banks. This has its advantages, but it also suffers from the defect we ascribed to osier. The trunks may occasionally become diseased; tunnels and cavities will open up in the dead tree. Others - and this I prefer above all else - line the bank with bushes and a whole variety of hydrophilic plants whose roots are tougher than their branches; of these the most notable are the Celtic nard, rush, reed, and, above all, osier. This last has a large and widespread root, sending out long, tough fibres, while its branches are slight and flexible, and play with the waves without causing an obstruction; it has, moreover, another advantage, that in its greed for water it will continually advance below the waterline.”

One could hypothesize a relationship between the inclusion of this topic as a reflection of the observations on
nature contained in *Theogenius*.

A similar combination of components is present in the treatise *On Painting*. Here, Alberti describes how to paint intangible aspects, such as the body’s movements, emotions, and the surrounding environmental atmospheres. Developing these capacities requires a profound understanding of human nature, its context, vivacity, and relationships, as well as the concept of nature as an inner essence, and all-encompassing realm.

Therefore, Alberti specifies several artistic principles that a painter should adopt: circumscription, composition, and reception of light, which all contribute to the definition of *historia*.59

The concept of *historia* is particularly relevant, since it is through it that emotion and pleasure can be evoked in the eyes of any spectator. *Historia* is the means that connect inner and external nature. A painting should be viewed as a poetic text, whether tragic or comic, and its narrative should be determined by painting’s principles, such as composition, bodily expression, and the use of colour and light. Alberti’s intention, as expressed in paragraph 41, is to make the painting vibrate with life so that it will resound in the mind of the spectator.60 As always, nature appears the master of this process. As a result of their observations, regarding how nature has shaped human beings, the painter is able to capture how the human body changes its posture or movement in response to its feelings and the environment.

However, some aspects of movement can be imagi-
ned anew by the painter and redescribed by his inventions, whilst others are left obscure, to allow the spectator to visualise and recreate a feeling in their own life. Therefore, a gap forms between what is observed, what is thought about, and what is incorporated into the painting; these differences are not entirely derived from nature, but instead result from human creative processes.

Through the principle of *historia*, Alberti tackles the difficult topic of invention, which he views as a source of pleasure and beauty, but also suspicion. Invention is a creative process, which begins by recognising physical beauty, and then perceiving the best examples “from the most beautiful bodies” to combine into and artwork that “understand[s] and express[es] beauty.”

According to John R. Spencer, Alberti borrowed the concept of invention from Cicero, as defined in his work, *On Invention* (91-88 B.C). Here, Cicero presented the relevant principles on which the art of rhetoric, or eloquence, should be based. In order to effectively capture and convince a wide audience, an orator was required to combine thoughtful and suitable arguments, organising them logically into an effective narrative and by the use of appropriate terms. To explain this, Cicero used the example of a great painter, who before starting a work on two divine figures, should select between the most beautiful girls and boys in the city in order to copy elements from each:

“He chose five because he did not think all the qualities which he sought to combine in a portrayal of beauty could be found in one
person, because in no single case has Nature made anything perfect and finished in every part. Therefore, as if she would have no bounty to lavish on the others if she gave everything to one, she bestows some advantage on one and some on another, but always joins with it some defect.”

The result of this process is the emergence of a new awareness that artificial beauty could be greater than nature’s one. This awareness give way to a crucial issue regarding the real nature of artifacts in comparison with the natural realm, implying that nature can be positioned as a secondary and imperfect realm, which is only totally validated by the power exercised by human beings over their environment and other living beings.

In light of Theogenius and his other moral works, it is reasonable to assume that Alberti recognised the dangers associated with inventive processes, primarily due to human greed. Instead of using the creative process to create value, it can be critically understood how, from his point of view, such processes could have appropriated the qualities of others, and that of the environment, exploiting them as a resource. It is worth noticing that Alberti never explicitly used the term invention; his association with Cicero’s ideas was only supposed later by the critics.

However, in the third book of On Painting, Alberti illustrates, once again, the nature of his concerns. He emphasises how the moral purpose of historia would have been the result of the virtuous creative process developed by the painter. Alberti insists on the main aim of the painter “to obtain praise, favour, and goodwill for his work much more than
riches. The painter would have achieved this if his painting held and charms the eyes and minds of spectators,” striving to become “a good painter” that attends to “his morals.”64 Therefore, through these qualities, the artist would have been able to capture the external aspects of human beings and reveal their inner feelings and individual qualities, extending beyond simply pleasing the public, to incorporate the aim of contributing to a virtuous community.

It is evident as, increasingly ethical considerations appear alongside conceptions of art’s purpose, making architecture the most relevant discipline in this regard.

2.3 Momus: human nature and the art of building.

Among the ethical principles and his pessimistic view of human nature, embodied in the symbolic division between city and country in San Potitus, Theogenius, and Della Família, as well as through the artistic pursuit of painting, sculpture, and mapmaking, Alberti discerns the primary causes and effects of the misuse of human creative and technical achievements. This marks some of the first attempts at the difficult task of integrating a moral dimension into the creative realm. A vibrant mismatch appears which Alberti’s thoughts cannot wholly articulate or resolve. However, he is perseverant in looking for the point of convergence, where these aspects can join, nurturing humanity, setting limits on the uses of
technology, and drawing a line at the threshold of non-/human transformation.

A reading of *Momus* is crucial for understanding the transition between Alberti’s ethical reflections and the identification of architecture as a form of beneficial medicine for building a city and a harmonious civic life. *Momus* can be considered as a bridge to *On the Art of Building in Ten Books*, which represents the culmination of his explorations.65

In *Momus*, Alberti writes of a minor Greek god, Momus, and the vicissitudes of his exile in the human world; he tells the tale of Momus’s travels between the heavens and earth whilst seeking divine forgiveness. Although this story deals with a completely different subject to those described previously, it can also be understood as a narrative device to represent the virtues and vices of human beings, and how their inner essence affects their behaviours with often disruptive results. The fortunes and misfortunes of human beings are described by Momus, who spends his exile on earth discovering how humans live. For instance, he visits the city and encounters all kinds of characters. Here, corruption, violence, and chaos reside, except for a few places; the temple embodies civic values and where the god, Virtue, finds refuge. Then, Momus moves to the countryside, which still identified as a place for virtuous human beings, where two philosophers, Socrates and Democritus, live in exile from the city and its social conventions. Therefore, through Momus’s travels and the characters he encounters, unlike previous ethical works, Alberti’s investigation begins to triangulate reflections on hu-
man nature, the notion of nature as a natural environment, and architecture, achieving what he previously did not achieve. It is enough to focus on some specific paragraphs to appreciate their connections.

The scene where Alberti describes Gelastus and Charon’s journey from the underworld to Earth is the most significant. Walking out of the underworld towards the Earth, Charon and Gelastus find themselves in a flowery field, surrounded by a rural landscape. Charon is captivated by the view and the smells, which fill him with joy and astonishment. He would like to stay there forever. Here, a dialectic opposition between pristine nature and the city – between the potential for natural and human transformation - reaches a crucial point. Alberti forces the reader to reflect on the idea of beauty in terms of its visual and spiritual dimensions, and whether it belongs to the natural realm, or to the artificial world created by human beings. What is the relationship between nature and architecture? And is there a difference between the beauty of nature and that of architecture? Answers are provided by Gelastus, who invites Charon to continue their journey and admire the achievements of humans within the city. There, Gelastus promises, they will find a place as wonderful as the field of flowers: the theatre.

While walking towards the city, Charon asks Gelastus about the origin of this natural beauty. Gelastus offers him a philosophical explanation, taken directly from Aristotle; he explains a formal cause, which is what gives matter its form, and a final cause, which gives a thing its purpose. In nature,
without contradiction, the formal and final causes suggest a most harmonious balance.

Charon is unsatisfied with this explanation, which does not seem to capture the deep beauty of nature, but rather confines it to theorisation. As they reach the theatre, Charon’s judgment is finalised: the beauty of nature is unique and all-surpassing.

“You neglect the flower: should we admire the stone? Everything within the flower aims to beauty and grace. These human works are a waste of energy.”

Although Charon’s judgment on architecture is sharp and conclusive, other scenes provide the reader with a more diversified perspective, clarifying the range of Alberti’s thoughts. In the scene where Juno asks Jupiter to further adorn her house with luxurious ornaments, this seemingly trivial request should be viewed as highly significant. This signifies the juncture in the narrative where Alberti commences the delineation of suitable architecture in its endeavour towards the common good, juxtaposed against an inferior architecture or aedificandi libido, as illuminated by Alberto G. Cassani. It is only by understanding what is appropriate that architecture can reach an approximation of natural beauty.

The same distinction is given by Alberti in another scene of the fourth book, in which the city celebrates a significant event through large ceremonies. Taking inspiration from the Jubilee that took place in Rome during the papacy of Nicholas V, Alberti describes it as a crowded and spectacular
event, due to the large number of people attending as well as the extensive presence of temporary installations that are carefully planned, ornamented, and intended to impress. Every detail is set up to represent the power of the Pope and his idea of a new Rome.

Despite being the architect informally commissioned by Nicholas V for the renewal of Rome,70 according to recent studies on Momus and regarding its dating, Alberti expressed growing discontent with the Pope’s revival schemes.71 Scholars such as Eugenio Garin, Alberto G. Cassani, Stefano Borsi, and Rinaldo Rinaldi see Alberti’s growing disagreement with the Pope’s renewal plans and disappointment at the effectiveness of their collaboration as subtly found in many parts of Momus.72 This critique, scholars argue, arose from Alberti’s realization that the projects carried out for Nicholas V were merely grand spectacles serving political power, not fulfilling the civic purpose that Alberti envisioned for architecture.

Although Alberti’s fourth book in Momus doesn’t explicitly underscore the value of architecture in earlier scenes, according to Cesare Cancro, it contains a significant “epistemological” turning point from “a philosophical perspective to an artistic-scientific one.”73 Jupiter’s quest to design a new world to strengthen his control over humanity leads to seeking advice from gods and philosophers, ultimately concluding that architects would have been the best advisors.74 This statement serves as a warning against the manipulation of architecture for political ends. On the other hand, through the words of Jupiter, reiterated a few paragraphs later by Charon
in reference to the value of painting, Alberti emphasises the “role of understanding nature and human beings” that architecture and the arts offers due to their experimental approaches. This anticipates in Momus “the great synthesis of reality that will appear in On the Art of Building in Ten Books,” in establishing the civic role of architecture.

2.4 Architecture as a beneficial medicine.

The idea that architecture has a relevant civic role is evidenced in reading the prologue of On the Art of Building in Ten Books. In the beginning of the writing, Alberti praises architecture, elevating it above other forms of art; the architect gets his distinct sense from the carpenter, towards “understanding and knowledge of all the highest and noble disciplines.” Already here, Alberti specifies that architecture is the art of building to both physically protect and also to “draw and keep together,” human beings. In this sense, public buildings and spaces, “walks, swimming pools, baths, mills, (…),” play a key role in constructing a community, “happily satisfying daily needs.” Throughout the seventh, eighth and ninth books, the role of architecture in contributing to the civic essence of a city is reiterated. The seventh book begins with the statement:

“The principal ornament to any city lies in the siting, layout, composition, and arrangement of its road, squares, and individual
works: each must be properly planned and distributed according to use, importance, and convenience. For without order than can be nothing commodious, graceful, or noble.”

The forms, ornaments, materials, locations, and functions of an architectural work should not only enhance the functionality of a city, but also embody its essence as a civic artefact in which a community can live and prosper. The beauty of buildings and cities appears as a result of this function.

However, it is in the eighth book that, as suggested by Caspar Pearson in *Humanism and the urban world: Leon Battista Alberti and the Renaissance city*, that Alberti investigates the city as a whole, including its surrounding territory, by the act of walking towards it. Perhaps, his choice to begin his walk in the countryside may be understood as a renewed call to nature as a source of beauty, and to the symbolic values of the Arcadian landscape. This could be suggestive of Alberti’s wish to reconcile the countryside and city, which seem to metaphorically stand for opposing moral values in *Theogenius* and his previous ethical works. The art of building then offers a kind of healing which can dissolve this conflict, embracing a civic function in alliance with nature.

Alberti shifts his focus towards internal and external relationships, rather than architectural objects and particular sites. His journey starts from a view of the countryside and the villages that lie beyond the city, describing roads and houses, outlined by observing the natural shape of the terrain. His eyes capture a sense of beauty and harmony that arises not just from a system of numbers and proportion, but from the
pleasantness of the landscape seen with the city at a distance. He continues his journey, walking through a graveyard and explaining the meaning of his surroundings. He progresses until reaching the city limits, where he begins to analyse the role of the city gates and different kinds of roads.

From this point on, the countryside is left behind. His entrance into the city provides a chance to explain the importance of three categories of roads: those with a specific character and shape by reason of their uses, those designed to connect with sacred places or public buildings, as well as those referred to as common roads. Moving through a description of theatres, amphitheatres, and places for the comitia, he suggests their appropriate shape as well as proper ornamentation. He continues, describing the importance of connecting public buildings with open spaces for pleasure, such as groves and pools. Aside from embellishing the city, these spaces symbolically represent the virtuous moral values of the civic role. These two elements, groves and pools, also echo the landscapes found in Theogenius, encapsulating the Arcadian atmosphere of forests and water sources where shepherds, animals, and plants, as well as divine forms including nymphs, dwell together. Alberti’s depiction of the main characters, animals, and the vegetal landscape in Theogenius showcases their harmonious existence within natural laws. Pearson’s notion regarding public spaces, as described by Alberti in the eighth book, is reflective of their power to “civilize” and foster the development of “better citizens”.82 Through the mention of pools, a “green flowery meadow,” and groves incorporated
in these public spaces, Alberti’s vision of a harmonious city isn’t exclusive, embracing other realms in a sign of symbiotic coexistence and peace.  

Alberti illustrates the significance of the library in the city, assigning it an importance akin to the sacred buildings depicted in the seventh book. According to Pearson and Jarzombek, the presence of the library, representing the heart of a new culture, housing books, mathematical instruments, maps, and statues of ancient poets, symbolizes the nature of the “humanistic city.”

“I shall only observe, that the principal ornament of a library, is the number and variety of the books contained in it, and chiefly their being collected from among the learned remains of antiquity. Another great ornament, are curios mathematical instrument of all sorts, especially if they are like that made by Posdonius, in which all the seven planets performed their proper revolution by their own motion.”

It is here, in the centre of the city, that Alberti’s journey comes to an end. This choice highlights the nature of the narrative content and form across two levels of understanding. Firstly, on a more literal level, Alberti explains the principles upon which the art of building is based, derived mainly from the idea of nature as a model. He provides thoughtful observations supported by historical and philosophical references, creating a solid text characterised by objectivity and scientific reasoning. This approach outlines the main principles of building and provides a series of practical prescriptions. Secondly, a symbolic level of understanding becomes
apparent, derived mainly from Alberti’s conceptions of nature as an all-encompassing immanent realm.\textsuperscript{86} Water sources, trees, mathematical instruments, and the statues of poets in the library all transcend the realm of reality, referring to ethical reasoning and the concept of virtue. This sense is also expressed in *Theogenius*: “we don’t live just for ourselves.”\textsuperscript{87} By incorporating this symbolic level into his definitions of the art of building, Alberti emphasises the civic responsibility of architecture, as a kind of beneficial medicine, which heals and can construct a peaceful community, providing a greater sense of beauty that is both aesthetic and ethical.\textsuperscript{88}

Regarding this last dimension, beauty, Alberti dedicates a chapter in the penultimate book of his treatise to reflections on the principle of *concinnitas*, attending to how its proper application can generate beauty. The concept of *concinnitas* relates to the harmonic composition of parts, numerical proportions, and geometrical outlines in the natural world while simultaneously encompassing the internal and external aspects of humans and their environment:

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That is why the mind is reached by way of sight or sound, or any other means, concinnitas is instantly recognized. It is our nature to desire the best, and to cling to it with pleasure. Neither in the whole body nor in the parts does concinnitas flourish as much as it does in Nature herself. Thus I might call it the spouse of the soul and of reason. It has a vast range in which exercise itself and bloom, it runs through man’s entire life and government, it molds the whole Nature.”\textsuperscript{89}
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Alberti provides further explanation; the concept of
concinnitas is “a form of sympathy and consonance of the parts within a body, according to definite numbers, outlines and positions, as dictated by concinnitas, the absolute and fundamental rule in nature. This is the main object of the art of building, and the source of her dignity, charm, authority, and worth.” ⁹⁰ Concinnitas is, therefore, the principle that provides buildings with their dignity, authority, and charm. As a result, the concept of beauty is enhanced both in terms of symbolic understanding and in terms of its aesthetic qualities. When applied to Alberti’s works, the Arcadian discourse finds its way into architecture as a form of aesthetic mediation. ⁹¹

2.5 The final book and the return to the prologue of On the Art of building in Ten Books.

The tenth book, which concludes Alberti’s treatise, may seem secondary to the overall work by a reading of its title alone, “On the Art of Building, in which the restatement of buildings is described.” ⁹² In the opening chapter of Alberti’s book, he explains the external factors that can cause buildings, their materials, and their structures to become corrupted. Among those, time is regarded as the factor that “conquers all things” by its degenerative effects, along with natural agents such as the sun, wind, low temperatures, storms, and other natural disasters. ⁹³ Yet, Alberti does not miss out on the opportunity to underline that the greatest danger is posed by hu-
“Then there is damage caused by man. God help me. I sometimes cannot stomach it when I see with what negligence, or to put it more crudely, by what avarice they allow the ruin things that because of their great nobility the barbarians, the raging enemy have spared; or those which all-conquering, all-ruining time might easily have allowed to stand for ever.”

The severity with which he addresses human beings and their greedy behaviour echoes Theogenius, which Alberti then directly refers to in the next paragraph in his discussion of natural disasters and their impact on cities. The fact that Alberti references this cannot be ignored for a few reasons. By using this reference, along with the one in the second book, he seems to close the circle, removing doubt regarding the consistency of his thoughts across his works. In addition, it is significant that the reference to Theogenius highlights the fragility and weakness of territories, cities, buildings, and human beings, by taking up the connection between human behaviours and the environment, as drawn by Alberti in his earlier works.

In the following paragraphs, instead of leading the reader to learn about techniques used to tackle time and external agents that threaten buildings, as one may expect, Alberti, surprisingly, brings the reader back to the beginning of his reasoning on architecture, explaining a few preliminary transformative actions that are necessary before any architectural activities can proceed. Amongst these considerations, Alberti highlights the management of water as a primary
source of wellbeing for all living beings: “There are four operations concerning water: finding, channelling, selecting and storing.” More than others, these activities as first of human beings on the ground refer to the origins of the relationship between nature and culture. Even as the following chapters extend Alberti’s explanations to include various techniques and tools, as explained above, these considerations seem to echo the expressions used in his premise, “cutting through rock, (...) tunnelling through mountains or filling valley, (...) restraining the water of the sea and lakes, and draining marshes, (...) altering the course and dredging the mouths of rivers.” This invites a return to the prologue in order to discover further aspects.
Endnotes

2 (Translated by the author). Ibid., 57.
3 See chapter 1, and endnote 59.
5 See chapter 1, and endnote 1.
6 Coluccio Salutati was an Italian politician, writer, philosopher, and chancellor of the Republic of Florence from 1375 to 1406. He was born in Stignano (Italy) in 1332 and died in Florence in 1406. Leonardo Bruni was an Italian politician, writer, and chancellor of the Republic of Florence from 1427 to 1444. He was born in Arezzo (Italy) in 1370 and died in Florence in 1444. Poggio Bracciolini was an Italian writer; he was born in 1380 and died in Florence in 1459.


7 It is possible that Alberti was affected by *De vera Nobilitate*, published in 1440, by Bracciolini, who was one of the first to discuss these concepts. This dialogue, between Lorenzo de’ Medici and Niccolò Niccoli, was intended to explore where the origins of the concept of nobleness - whether it is rooted in inner virtue and family lineage, as Lorenzo claimed, or whether it is solely rooted in internal value, as stated by Niccoli. Against the floating fortune’s effects, nobleness could be considered the only weapon. While wealth, health, and beauty are influenced by fortune, as well as social status and geographical locations, nobleness should seen as a permanent characteristic bound to virtue: “Who is noble? Who is naturally predisposed to act virtuously.” (Translated by the author).
Beyond the correctness of these examples, there is an interesting connection between virtues and cities that Alberti takes up. A virtuous human being is happy in mind and body, and a virtuous society is happy in mind, body, and territory. Thus, this quality does not reside exclusively in contemplative life but can also be nurtured to contribute to social development.

Poggio Bracciolini, *De vera Nobilitate* (Rome: Salerno Editrice, 1999), 112.

8 (Translated by the author). Alberti, “Theogenius,” 64.

9 (Translated by the author). Ibid., 66.

10 (Translated by the author). Ibid., 77.

11 Regarding Lucretius reference see chapter 1.

Pliny describes human fragility in a similar manner: “On all the rest in various wise she bestows coverings—shells, bark, spines, hides, fur, bristles, hair, down, feathers, scales, fleeces; even the trunks of trees she has protected against cold and heat by bark, sometimes in two layers: but man alone on the day of his birth she casts away naked on the naked ground, to burst at once into wailing and weeping, and none other among all the animals is more prone to tears, and that immediately at the very beginning of life.”


13 (Translated by the author). Ibid., 93.

14 “If we take into careful consideration the abundant supplies of water in public buildings, bath, pools, opens channels, private houses, gardens, and country estates near the city; if we consider the distances traversed by the water before it arrives, the raising of arches, the tunneling of mountains and the building of the level routes across deep valleys, we shall readily admit that there has never been anything more remarkable in the whole world.”


15 Ibid., 191.


17 *Orator* was written around the 46 B.C.

18 *Nature of the Gods* was written around 45 B.C.

19 “And first let us behold the whole earth, situated in the centre of the world, a solid. The earth and the other elements The sun, moon and planets spherical mass gathered into a globe by the natural gravitation of all its parts, clothed with flowers and grass and trees and corn, forms of vegetation all of them incredibly numerous and inexhaustibly varied and diverse. Add to these cool fountains ever flowing, transparent streams and rivers, their banks clad in brightest verdure, deep vaulted caverns, craggy rocks, sheer
mountain heights and plains of immeasurable extent; add also the hidden veins of gold and silver, and marble in unlimited quantity. Think of all the various species of animals, both tame and wild! think of the flights and songs of birds! of the pastures filled with cattle, and the teeming life of the woodlands!”


20 “Moreover men’s industry, that is to say the work of their hands, procures us also our food in variety and abundance. It is the hand that gathers the diverse products of the fields, whether to be consumed immediately or to be stored in repositories for the days to come; and our diet also includes flesh, fish and fowl, obtained partly by the chase and partly by breeding. We also tame the four-footed animals to carry us on their backs, their swiftness and strength bestowing strength and swiftness upon ourselves. We cause certain beasts to bear our burdens or to carry a yoke, we divert to our service the marvelously acute senses of elephants and the keen scent of hounds; we collect from the caves of the earth the iron which we need for tilling the land, we discover the deeply hidden veins of copper, silver and gold which serve us both for use and for adornment; we cut up a multitude of trees both wild and cultivated for timber which we employ partly by setting fire to it to warm our bodies and cook our food, partly for building so as to shelter ourselves with houses and banish heat and cold.”

Ibid., 269 and 271.

21 “Timber moreover is of great value for constructing ships, whose voyages supply an abundance of sustenance of all sorts from all parts of the earth; and we alone have the power of controlling the most violent of nature’s offspring, the sea and the winds, thanks to the science of navigation, and we use and enjoy many products of the sea. Likewise, the entire command of the commodities produced on land is vested in mankind. We enjoy the fruits of the plains and of the mountains, the rivers and the lakes are ours, we sow corn, we plant trees, we fertilize the soil by irrigation, we confine the rivers and straighten or divert their courses. In fine, by means of our hands we essay to create as it were a second world within the world of nature.”

(…) It must therefore be admitted that all this abundance was provided for the sake of men, unless perchance the bounteous plenty and variety of our orchard fruit and the delightful not only of its flavour but also of its scent and appearance lead us to doubt whether nature intended this gift for man alone! So far is it from being true that the animals also are created for his use, the fruits of the earth were provided for the sake of animals as well as men, that the animals themselves, as we may see, were created for the benefit of men. What other use have sheep save that their fleeces are dressed and woven into clothing for men? and in fact they could not have been
reared nor sustained nor have produced anything of value without man’s
care and tendance. Then think of the dog, with its trusty watchfulness, its
fawning affection for its master and hatred of strangers, its incredible keen-
ness of scent in following a trail and its eagerness in hunting—what do
these qualities imply except that they were created to serve the convenienc-
es of men?”
Ibid., 269 and 271.
22 “Terrenorum item commodorum omnis est in homine domi-

23 nates.” Ibid., 269 and 271.
23 Italo Calvino, “Introduzione,” in Plinio, Storia Naturale (Turin: Einau-
di, 1982), VII-XVI.
24 “the things of fortune no longer worth in themselves except as we re-
pete them, she can nothing be molesting to us.” (Translated by the author).
Alberti, “Theogений,” 95.
25 (Translated by the author). Ibid., 100.
26 The Venetian extension of nobleness beyond family lineage is con-
firmed by Gino Luzzatto and Frederic Lane. They claim that “during
the twelfth and thirteenth centuries the ruling class remained open and acces-
sible to new men—to men who recently had made their fortunes in the
volatile world of international trade. The acceptance of these novi cives
by the ruling aristocracy relieved the pressure that the pent-up frustrations
of new men seeking power created in other Italian cities. Lauro Martines
suggests that when the closing of the Venetian ruling class did come, in the
early fourteenth century, it coincided nicely with a general contraction of
the economy. The Venetian nobility closed ranks at the very moment when
the volume of new men making their fortunes and seeking power declined.”
Dennis Romano, Patricians and Popolani, The Social Foundations of the
Venetian Renaissance State (Baltimore: Johns Hopkins University Press,
Gino Luzzatto, Storia economica di Venezia dall’XI al XVI secolo (Padua:
Marsilio 1995), 117.
Frederic Lane, Venice, A Maritime Republic, (Baltimore: Johns Hopkins
University Press 1973), 114-117.
27 Bracciolini, De vera Nobilitate, 110-112.
28 Romano, Patricians and Popolani, 36.
29 “And what shall I about the crowds of people, the beauty of the build-
ings, the magnificence of the churches, the unheard of and wonderful luster of
this whole city? (…) The industrious citizens have taken care of every-
thing; things are arranged this, that while all dirt is cleaned up, you only
encounter those things that bring joy and are pleasing to the senses.”
Leonardo Bruni, In Praise of Florence: The Panegyric of The City Of Flo-
rence, And An Introduction To Leonardo Bruni’s Civil Humanism, trans
30 Ibid., 104.
31 See chapter 3.
32 Eugenio Garin, “Studi su Leon Battista Alberti,” in *Rinascite e rivolu-
33 See introduction written by Massimo Cacciari in Raphael Ebgi, ed., *Umanisti italiani. Pensiero e destino* (Turin: Einaudi, 2016), VII-XXV.
34 *Della Familia* was written around 1433-1434. *Intercenales* was written around 1450 and *Apologhi* around 1440.
Alberti, apologhi e elogi*, 108-126.
41 Ibid., 36.
42 “Would it not have been more preferable to have invested the care and expenses in a more worthwhile project? (…) It is also advisable to avoid any undertaking, no matter how expedient, worthy, and easy to execute it may appear and even though the means and opportunity are at hand, if its very nature makes it prone to suffer immediately, or through the neglect of subsequent generations, or from the wear and tear of everyday use.” Ibid.,
36.
43 *On Painting* was written around 1435. *Delineation of the city of Rome* and *Ludi Matematici* were written around 1450. *On Sculpture* was written around 1462.
44 Plato, *Timaeus*, Volume 10, trans. Robert Greg Bury, Loeb Classic Li-
45 “We may say that the world became a living creature truly endowed with soul and intelligence by the providence of God.”Ibid., 55.
46 Ibid.,117.
47 See chapter 1, endnote 41.
49 Ibid., 129.
50 The images (FIG.1, 1a, 1b, 2, 3) belong to a subsequent illustrated edition of *On the Art of Building in Ten Books*. Leon Battista Alberti, *The Architecture of Leon Battista Alberti in ten books: of painting, in three books: and of statuary, in one book*, translated by James Leoni printed in 1726. The first edition of the treatise dates back to 1485, which was without illustrations.
52 They respectively mean outlines, arrangement, and place.
55 Ibid., 338-339.
56 Ibid., 337.
57 Ibid., 338.
58 Ibid., 348.
60 “A "historia" will move spectators when the men painted by this picture outwardly demonstrate their own feelings as clearly as possible. Nature provides that we mourn with the mourners, laugh with those who laugh, and grieve with the grief-stricken. Yet these feelings are known from movements of the body.” Ibid., 81.
61 Ibid., 99.
64 Ibid., 95.
65 *Momus* was written around 1450.

the idea, drawing and *libido aedificandi.*” On page 197 to 200, she analyses this concept by drawing on Alberti’s first mention of it in *On the Art of Building in Ten Books,* in the first chapter of the second book, in connection with earlier ideas in previous works, such as *De Commodis:*“(…) where there is no longer any cause for hesitation or opportunity for improvement, even then would I advise you not to let your desire to build (*libidinae aedificandi*) impel you headlong into commencing the work.” Alberti, *On the Art of Building in Ten Books,* 35.


70 Nicholas V’s plans for Rome, such as the Vatican Palace, Capitoline, and St. Peter’s, are described by Giannozzo Manetti in his biography on the Pope, *De vita ac gestis Nicolai Quinti summi pontificis,* written in 1455 one year after Nicholas V’s death. Many studies have been published regarding this text, such as Anna Modigliani, ed. *Giannozzo Manetti, Vita di Niccolò V* (Rome: Roma nel Rinascimento, 1999), and Laura Onofri, “Sacralità, immaginazione e proposte politiche: la “vita” di Niccolò V di Giannozzo Manetti, in *Humanistica Lovaniensia,* Vol. 28 (1979): 27-77.

A relevant book that describes the urban planning with a focus on its principles and contributions has been written by Carroll William Westfall, *In this most perfect paradise: Alberti, Nicholas V, and the invention of conscious urban planning in Rome,* 1447-55 (Pennsylvania: State University Press 1974). However, in addition to analyzing Manetti’s description and Nicholas V’s project, Carroll William Westfall’s text focuses on the intellectual, philosophical and aesthetic context in order to demonstrate Alberti’s substantial participation. According to Westfall, Nicholas V’s urban plan was intended to convey the religious power of Western church doctrine and the role of the Pope as temporal ruler and patron of the arts. In chapter three, “The theoretical background from Nicholas V’s urban Program,” Westfall asserts that the principles of virtue and eloquence that guided Nicholas V’s plan were derived from Alberti’s treaties, *On painting* and the ideas contained in *On the Art of Building in Ten Books,* demonstrating the
productive relationship between them.

In this regard, clarification is necessary. While the collaboration between Alberti and Nicholas V is historically undeniable, it has been scaled back by scholars who have highlighted the ambiguity of the collaboration (he never had a formal assignment) and discrepancies between Alberti’s ideas and the Pope’s intentions. See Rinaldo Rinaldi “L’intero separato. Conservazione e controllo nel “De re Aedificatoria,” 191, and Howard Burns, “Leon Battista Alberti,” in Storia dell’architettura italiana. Il Quattrocento (Bologna: Università: Università di Bologna) 114-165. In addition, Manfredo Tafuri, in the introduction of the Italian version of the text, contests the emphasis placed by Westfall on Alberti’s contribution, pointing out discrepancies in ideas and intentions, despite considering the book to be historically significant since Westfall was able to “connect a plurality of historical paths belonging to areas traditionally jealous of their disciplinary boundaries.” (Translated by the author)


Furthermore, regarding Alberti’s contribution to Nicholas V’s urban plan, a most recent publication has been published by Stefano Borsi, Nicolò V e Roma: Alberti, Angelico, Manetti e un grande piano urbano (Florence: Polistampa Fondazione Spadolini Nuova antologia, 2009).

According to these studies, Momus was written concurrently with the drafting of On the Art of Building in Ten Books, around 1450, rather than during an earlier period of the 1440s. For this reason, the relationship between the facts masked between the lines of Momus, historical events, and the development of the architectural treatise have not been evaluated in a correlated and comprehensive way. On the contrary, Borsi’s text, Momus o del Principe: Leon Battista Alberti, i papi, il giubileo, providing a detailed comparison of Momus and On the Art of Building in Ten Books with previous works, has demonstrated their intertwine, thus assuming a later dating. “Despite the prevailing tendency to date Albert’s text to the early 1440s, this updated reading of Albert’s text has not been widely discussed. Despite this, several internal factors, outlined below, appear to point in a completely different direction, moving the chronology forward to the following decade.” (Translated by the author) Stefano Borsi, Momus o del Principe: Leon Battista Alberti, i papi, il giubileo, 10.

Eugenio Garin, “Il pensiero di Leon Battista Alberti: Caratteri e contrasti,” in Studi su Leon Battista Alberti, Rinascite e rivoluzioni: Movimenti culturali dal XIV al XVIII secolo (Rome: Laterza, 1975), 161-181. In 1975, Garin was the first to point out the oxymoronic character of Momus in comparison to On the Art of Building in Ten Books. Garin’s contribution was
effectively considered and developed in Stefano Borsi’s study published in Momus o del Principe: Leon Battista Alberti, I papi, il giubileo, more than 20 years later, in 1999.

Both Alberto G. Cassani in his essay “Attraverso lo specchio. Addenda al rapporto Momus” and Rinaldo Rinaldi in his text “L’intero separato. Conservazione e controllo nel De re Aedificatoria,” have reiterated Borsi’s hypothesis.

73 “Momus represents many themes dear to Alberti, but it is specifically the premise of one, namely architectural conception. Momus’ transition from a philosophical perspective (Aristotelian school) to an artistic-scientific perspective appears so natural as to be unexpected.” (Translated by the author)


74 “Jupiter particularly admired the innumerable large columns of Parian marble - pieces carved from great mountains, a gigantic labor. The columns were so numerous and so vast that he was at a loss to imagine how they had been dragged there and erected. Although he saw them with his own eyes, he still said that such work was impossible. Full of wonder, he could not stop looking at them and praising them extravagantly. He cursed his own stupidity and deplored his lack of foresight in having consulted the philosophers rather than the architects of this stupendous work. He should have gotten the architects to draw up a plan of the intended project.”


75 “I will tell you what I remember hearing, not from a philosopher - for all your reasoning revolves only around subtleties and verbal quibbles - but from a certain painter. By himself this man saw more while looking at lines than all you philosophers do when you’re measuring and investigating the heavens.”


76 (Translated by the author) Cancro, Filosofia e architettura in Leon Battista Alberti, 158.

77 (Translated by the author) Ibid., 161.


79 Ibid., 3.

80 Ibid., 191.

81 The idea that the description included in Book VIII can be seen as an imagined journey through a kind of ideal city is suggested by Caspar Pearson, Humanism and the urban world: Leon Battista Alberti and the Renaissance city (Pennsylvania: Pennsylvania State University Press, 2011), 98. See also Mark Jarzombek, On Leon Battista Alberti. His Literary and Aes-

“In the first two of ten chapters into which book 8 is divided, we find the author in the countryside, travelling along a highway, viewing houses, villas, a fine hill, now a river, and now a spring, now an open spot and a rock, now a plain, wood, or valley.”

82 Nonetheless, there is a marked optimism in Alberti’s approach to the city in Book 8. He seems here to be convinced of the civilizing effects of the civitas in a way that he is not elsewhere. He evidently enjoys the idea of the elders resting and transacting business at crossroad porticoes. The notion that their presence will moderate the behavior of the youth clearly demonstrates a belief that concourse of people in the city, and public places in which the citizens may mix, can have a restraining, humanizing effect. (…)

Again, here is the idea that the city can civilize and that concourse can make people better citizens. In the same spirit, the parades and “sitting rooms.” Pearson, Humanism and the urban world: Leon Battista Alberti and the Renaissance city, 99-100.

83 In addition, Jarzombek’s observation that the presence of a green flowery meadow represents symbolically a peaceful city, citing a passage in Alberti’s fifth book that describes Palestre, may be understood as suggesting a further connection between natural elements in the city as a sign of harmonious society: “If the humanist scholar can stretch out contentedly in the inner sanctum of the palestre at the center of the city, then the city is at peace.” Mark Jarzombek, On Leon Battista Alberti. His Literary and Aesthetic Theories, 115.

84 In describing Alberti’s journey towards the city, Mark Jarzombek highlights how the choice to place the library as the terminal location has symbolic meaning in defining Alberti’s humanistic city: “In chapter 9 he comes to the end of his journey, the spiritual, political, and intellectual center of the city “to be used only by the principal citizens.” He describes the Senate house, the temple, “free from all contagion of secular things,” lakes for swimming, groves dedicated to the gods, arsenals and finally a library that also houses a collection of mathematical instruments.” Mark Jarzombek, On Leon Battista Alberti. His Literary and Aesthetic Theories, 113.

Referring to Jarzombek, Caspar Pearson also cautiously hypothesizes that the library and other buildings embody a new humanistic city. He suggests that Alberti’s emphasis on this part of the city in the eighth book as consisting of secular buildings compared to the sacred ones described in the seventh book could be considered an additional factor in support of this hypothesis.

“The interpretation of Book VIII as presenting a humanist city in which the library is central and wisdom prevails, would seem to capture one aspect of Alberti’s thought here. Arguably, however, he is more concerned with the
logic of his treatise, describing in turn the chief public secular buildings and discussing their ornament, just as he says he will. Nonetheless, there is a marked optimism in Alberti’s approach to the city in Book VIII. He seems here to be convinced of the civilizing effects of the civitas in a way that he is not elsewhere.” Pearson, Humanism and the urban world: Leon Battista Alberti and the Renaissance city, 99.


86 In addition, Carroll William Westfall has emphasised Alberti’s contribution in terms of his symbolic understanding of architecture, demonstrating his influence on the transformation of Rome under the Pontificate of Nicholas V. By adopting this understanding, the Pope addressed his new projects for the city politically.


The presence of this symbolic level within architecture, and its slow disappearance over time, has also been highlighted by Tafuri, recalling that “between the end of the 16th century and the end of the next century, we moved from a state of fusion between architectural code and collective functions (practical and symbolic at the same time) to a general grammar (...) and the loss of semantic autonomy.”


87 See chapter 2.

88 This connection between medicine and the city is not new. Despite not specifically referring to Greek culture, Joseph Rykwert has argued that ancient civilizations perceived a break in the construction of the city so clearly that omen rituals were sought and performed in order to reconcile human beings with nature, by altering the natural shape of territory in sacrilegious human action. Taking a look at the etymology of the word pharmakos, the idea of the reconciliation of sacred boundaries, including that of civic life, can be found again. Pharmakos has multiple meanings: it can be defined in a more negative way as poison, or can be given a positive meaning as medicine, which is the definition most commonly used in languages today. The first two meanings come from the character of pharmakos, a scapegoat used in ancient Greek purification rituals. These took place with human sacrifice: a man, after being fed, was expelled from the city in order to keep away natural catastrophes, especially droughts. This was a ritual strongly connected with the annual agricultural cycle that provided economic well-being to the Polis. The men and women selected for the ritual were citizens and part of the community. They were not foreigners, but were thought of as internal poison that became medicine for healing upon their exile, through the pu-
rification ceremony. This movement from inside to outside expresses, on the one hand, a clear removal of the negative poison; on the other hand, it speaks to a sort of inner-urban “homeopathic process”, where a toxic substance can become a therapeutic element. *Pharmakos* is simultaneously the outcast and the saviour.

The notion of a healthy and an unhealthy body or community, from which the role of *Pharmakos* arises, was already discussed by Plato in *Timaeus* and developed later in *Critias*, where he refers to the story of Atlantis and Athens, their different origins and destinies. In fact, Plato describes how Atlantis started to become corrupted, bringing the empire to an end, and highlighting the citizens as those mainly responsible. He shows their increasing greed causing a transformation through time in Atlantis’ topography, via a network of artificial canals, bridges, and arsenals. These hydraulic works changed the existent ground completely, encouraging the development and intensive use of the land.

The same insatiable wish led them to extend their boundaries over the external region (*khora*). In conclusion, Plato defines a linear correlation between the inner nature of human beings, as derived from the cosmological shaping of the universe and their actions, in the sense of urban disease. Greed and lack of wisdom are not just human inner conditions of existence but, on the contrary, affect their environment, in particular the city and its health. Not considering this belief means undermining the harmony of the Cosmos. Plato describes this unbalance as increasing the loss of the divine aspect of the human being.


90 Ibid., 303.

91 See in the introduction and endnote 31, Latour’s concept of human beings as mediators.

92 Ibid., 320-362.

93 Ibid., 320.

94 Ibid., 320.

95 Ibid., 321.

96 See introduction, the myth of Gaia and Chthonia.

97 Ibid., 3.
3. Leon Battista Alberti and Daniele Barbaro: the comparison between two ideas of nature.
3.1 Alberti’s and Barbaro’s statements.

To conclude the previous chapter, I quoted a few sentences of an important paragraph from Alberti’s prologue to *On the Art of Building in Ten Books*.

“Finally, need I stress how, by cutting through rock, by tunneling through mountains or filling valley, by restraining the water of the sea and lakes, and draining marshes, through the building of the ships, by altering the course and dredging the mouths of rivers, and through the construction of harbors and bridges, architect has not only met the temporary needs of men, but also opened up new gateways to all provinces of the world? As a result, nations have been able to serve each other by exchanging fruit, spices, jewels, experience and knowledge, indeed anything that might improve our health and standard living. Nor should you forget ballistic engines and machines war, fortresses and whatever else may to protect and strengthen the liberty of our country, and the good honor of the state, to extend and confirm its domination.”¹ (Leon Battista Alberti)

According to Manfredo Tafuri, this paragraph is not just meaningful *per se* as Alberti’s statement about the significance and role of architecture. A further meaning is suggested when considered in comparison with a statement provided by Daniele Barbaro in his commentary on Vitruvius’ treatise - *The Ten Books of Architecture*.² One could argue that Barbaro’s work does not hold value equal to Alberti’s; it is significantly different in nature since it is intended as a commentary and therefore presents the authorial voice with a different degree of participation. However, this aspect did not prevent Barbaro from emphasising and interpreting Vitruvius’s words
in terms that revealed his own observations on the architecture of Venice at the time.³

“Yes, we truly can: first with regard to cognition and then with regard to operation, because in knowing and judgement it is comparable to wisdom and prudence and by operations [Architecture] shines out clearly among the arts as heroic virtue and queen. A wondrous thing is the power to act for the common good, to gather uncivilized men and lead them into religion and sure discipline, and make them peaceful in cities and fortresses, and then, with more violent force against nature, cut through boulders, tunnel through mountains, fill the valleys, drain the marshes, build the ships, straighten rivers, fortify the ports, construct bridges, and surpass nature in those things in which we are by nature surpassed: raising immense weights; satisfying in part the desire for eternity; delighting those who do not build, and so much more those who do; ornamenting the empires, the provinces, the world.”⁴ (Daniele Barbaro)

Their statements can seem similar but deeply differ in terms of content as they draw on contrasting philosophical conceptions of nature. The purpose of my investigation is to highlight how these different philosophical perspectives concerning the notion of nature have had an impact on the concept of architecture as a discipline, as well as the role it plays in designing the city. The investigation will focus mainly on Barbaro’s commentary of Vitruvius’s treatise - The Ten Books of Architecture - and compare this to Alberti’s approach, which has already been deeply developed in the previous chapter.

Before analysing the content any further, it is relevant to contextualize Alberti and Barbaro’s statements within the texts they are extrapolated from, providing some observations.
Alberti’s statement is located in the middle of the prologue of On the Art of Building in Ten Books, where he explains that the aim of his treatise is “to inquire more fully into his (architect) arts and his business, as to the principles from which they derived, and the parts of which they are composed and defined,” considering this activity, architecture, as the most “honourable art” in giving “comfort and great pleasure to mankind, to individual and community” and “security, dignity and honour of the republic.” Precisely in order to underline the architect’s contribution to society and distinguish him from a carpenter, Alberti stresses his argument by writing the statement provided above.

Contrary to Barbaro’s statement, the subject pertains not only to architecture but to the figure of the architect as well. At the time, this was not just a minimal difference; Alberti was the first to construct an argument that could validate architecture as a liberal art, distinct from mechanical arts, as well as being the first to assess the figure of the architect specifically. We can assume that, one century later, when Barbaro wrote his commentary, this was no longer a topic of discussion. However, the objectification of the subject in Barbaro’s statement (clearly keeping Alberti’s ideas in mind and instead, shifting the focus from the architect to architecture) reveals his detached and less humanized approach to the subject. Additionally, Barbaro’s approach can be understood as demonstrating his wider intent to provide Venice’s government with a political device rather than a cultural and ethical contribution. This is extensively demonstrated when reading
the first book of his commentary. Barbaro’s statement aims to explain Vitruvius’s words:

“Therefore, this worthy discipline being copiously ornamented with so many diverse doctrines, I don’t think that anyone can immediately practice the profession and call himself an architect unless, brought up gradually with these degrees of science from a tender age, and nourished knowledge of the various sorts of letters, he arrives to the acme of architecture.”

(Daniele Barbaro)

Contrary to Alberti, who begins his treatise by explaining the principles of architecture, Barbaro devotes most of his efforts to demonstrating the supremacy of architecture as the most “heroic” among the arts. This supremacy is rooted in the philosophical concept of “beautiful truth.” Barbaro defines this concept by borrowing from Aristotle’s and Plato’s ideas, combining their conceptions of the good and the beautiful final cause of all earthly things. He distinguishes between the necessary truth and the contingent one. He first deals with intellectual processes and subjects, like science, as “habits of intellect” which require principles, proofs and wisdom, “which is the ready and fluent cognition of the proofs applied to the conclusions.” Instead, the arts, based on the will and desire of human beings, look for the contingency truth: “Art is a habit of the mind which reposes in a real subject that disposes it to make and operate according to rules and reasons outside itself the things that are useful for living. (…) Thus, art is closer to wisdom, which is the noblest habit.”

Among all the arts, architecture can provide the most “dignity and greatness” to human beings. This is due to its
similarity to sciences such as mathematics and geometry, but also including philosophy, natural history, natural science, and music. This abundance of knowledge seemingly qualifies it as a superior discipline, “heroic” and close to wisdom.¹² This latter term is borrowed from Aristotle, who made a clear distinction between intellectual virtues: technê, epistêmê, phronesis (practical wisdom), sophia, and nous. By attributing the quality of wisdom to architecture, Barbaro excludes it definitively from technê, due to its corresponding value and intellectual activity. This might seem contradictory since architecture has a material dimension and develops knowledge based on sensory experience. However, the latter is conceived as an essential part of architecture, in its “fabrication,” but only as a “track”¹³ of the true essence of things – namely, their formal or final cause in terms of Aristotle’s thoughts - as the main content of the discourse of architecture is understood to be theory.¹⁴

By his explanation, Barbaro expands Aristotle’s definition of the epistêmê of architecture, denoting its disciplinary autonomy on the same level as the sciences and, as a result, its role as the judge of all arts. Mechanical art, in particular, appears only as a functional discipline that is secondary to the authority of architecture. It is in wondering whether architecture is arduous to learn and practice that Barbaro, amidst trying to explain Vitruvius’s thoughts on human capacities for “receiving and retraining such a great variety of doctrine,” locates his statement, which opens with a praise of architecture based on two essential aspects:¹⁵
“Yes, we truly can: first with regard to cognition and then with regard to operation, because in knowing and judgement it is comparable to wisdom and prudence. and by operations it shines out clearly among the arts as heroic virtue and queen.”16 (Daniele Barbaro)

I believe that the terminology and narrative of this paragraph, along with the next, cannot be fully understood without linking to Barbaro’s idea of nature as expressed a few lines later.

“(…) and then, with more violent force against nature, cut through boulders, tunnel through mountains, fill the valleys, drain the marshes, build the ships, straighten rivers, fortify the ports, construct bridges, and surpass nature in those things in which we are by nature surpassed.”17 (Daniele Barbaro)

On the one hand, Barbaro never denies nature as a model of the universal laws that govern all things, including human intellect. On the other hand, although the content clearly echoes the first paragraph of Alberti’s statement, Barbaro’s words suggest a completely different philosophical approach: nature, as matter, can be surpassed for the benefit of humans, by the use of violent force if needed. He starts to distinguish nature between essence and matter on two different conceptual levels. Consequently, nature is conceived as a realm even more perfectible by the artistic process (architecture), crossing a line that Alberti was very careful not to do:

“Had nature brought us the aforesaid forms and ideas, without a doubt very little artfulness would need to be used. But since nature has not shown us the things said, it is necessary to turn to art, and since we seek to represent with art the effects similar to
those of nature, we need thought. Because it is difficult to realize our intention with art, great study and in industriousness are required.”18 (Daniele Barbaro)

The idea that nature is an imperfect realm is reiterated many times throughout Barbaro’s text. This appears more acutely in the preface of the tenth book, where Barbaro shares his thoughts regarding the undisputed usefulness of machines and tools to human beings, both for making ordinary works and, even more so, for contributing to artistic work.

“So, nature making some things contrary to the utility of men, and always operating in a consistent way, it is necessary to find in opposition to this contrariness a way to bend nature to human needs and use. This way is found with the aid of art, by means of which nature is conquered in those things in which nature conquers us.”19 (Daniele Barbaro)

The above statement clarifies Barbaro’s belief that machines can function to transform and resolve what is imperfect in nature. Even though nature’s intrinsic essence is flawless, it becomes imperfect when it conflicts with human needs. Therefore, this makes explicit two issues on which Barbaro’s text is based: firstly, human dissatisfaction is caused by nature and does not come from their own inner fragility, disputing what Alberti had claimed and excusing human beings from taking responsibility for their environment. Secondly, the needs of humanity are paramount above any other living being or concern for the natural environment. As a result, the imperfection of nature can be altered by the activity and ingenuity of humans, producing artificial objects that alleviate
conflicts and contradictions. Barbaro draws a rift between nature and the human being, as if the latter does not belong to the realm of the former. Thus, giving ground to conquer (a term taken from the lexicon of war), he places the human being and its transformative activity in a central and privileged position.

3.2 Della Eloquenza.

The idea of nature as a realm to conquer was not new to Barbaro, who reflected upon this in his previous work, *Della Eloquenza*, published in 1557. The aim of this work was to explore the art of discourse, or eloquence. It is written in the form of a dialogue between three women: Nature, Art, and Soul in the first section, and Art and Dinardo in the second. While the second part sets out to illustrate the most relevant principles of eloquence through compelling examples, the first part is more significant since Barbaro expresses his views on the relationship between nature and art, and the civic aims of eloquence when compared with philosophy. Although the seeds of his ideas in Commentary of *The Ten Books of Architecture* are already present, it is interesting to observe how, in this earlier work, Barbaro was still reflecting upon the danger posed by human beings and the effect this had on nature and art, and how this same argument would be filtered out of his later works.
Investigations as such can provide some equivalences and translations for appreciating his commentary on Vitruvius. The supposed relationship between eloquence and architecture was not new. Alberti had already adopted some elements of the art of oratory, such as Cicero’s *concinnitas* and Quintilian’s *inventio*, into his writings on architecture, although this was not directly stated. On the contrary, this parallelism appears explicitly in Barbaro’s text.

“Disputing is your thing. Art, my daughter!”

Nature responds to Art’s invitation to discuss their functions and the nature of their relationship through this address. From the very beginning of the dialogue, Barbaro demonstrates how he conceives of both: Nature is represented as the mother of all things, including art, and embodies a sort of hierarchical superiority. They are both devoted to the virtue of truth and goodness. However, by using the term “*disputare*” - which means dispute - Barbaro immediately warns us that their relationship is conflictual.

Nature is the mother of everything, including the two most significant values: goodness and truth; however, art is considered the means of expressing these virtues in the real world by enhancing “[Nature’s] insufficient resources.” Upon hearing this from Art, Nature attempts to defend herself, responding that nothing can be created without her resources. However, these words also point to the significant role art plays in improving nature’s imperfections, as Barbaro
would reaffirm in his commentary years later. Despite their short disagreement, Nature and Art are able to attenuate to each other, becoming allies over a common concern: human beings, their behaviours, and inner attitudes. It is decided that this poses the greatest danger to both art and nature, since human beings are frequently inclined to abuse both for nefarious and morally impermissible purposes: “[this awareness] pains me and for this reason, I have called you” Art explains “my greatness is subjected to many disasters. The greater my state is, the more I see myself subjected to dangers (…), since [human beings] do not direct me to a good aim, but turn me into something harmful and disgraceful.”24 Nature responds with the same concern: “You are not the only one in the evil hands of similar outrages, (...) by producing everything to benefit the life of those who are born, many wretched and full of bad talents, poorly using their devices, fill everything with confusion, yearning, killing, deceiving, offending without any regards those who hear and see such villainies, cursing my every deed.”25 Both Nature and Art agree that the real cause of the damages wrought by human behaviour cannot reside in their actions alone, but rather in the soul, similarly to “when the food on which one lives, (…) so often makes one in a bad mood.” 26 For this reason, they decide to summon the character of Soul, which appears on stage eager to receive Eloquence’s gift from Art, enabling her to “communicate my principles and concepts to others.”27

In this sense, eloquence is considered one of the most exceptional human disciplines; requiring an exercise
in self-knowledge that involves the ability to realise within oneself what one wishes to convey to others and vice-versa. It requires rationality, wisdom, and imagination. In comparison to philosophy, which is perceived as being detached from reality and engaged in an investigation of the truth, the art of speaking wisely is rooted in ordinary life, with the aim of educating virtuous citizens. Eloquence’s ability to shift modes of speaking between the human soul and civic bodies also makes her highly susceptible to misuse, for both individual and political ends. Art appears well aware of this danger when she states: “May evil men not use her. And because she has greater beauty and greater form than anything, great danger lies ahead. God forbid. But where does human wickedness not pass? Where does audacity not penetrate? And Nature can only little out of this.”28 This last observation confirms the dominant role of art over nature. Nature and Art are allies in the teaching process of virtuous eloquence, with their first offering being the content and voice for a soul, and their second offering constituting the right words and combinations of arguments. Nevertheless, only art can improve upon the nature of the soul by adding new qualities. In this sense, eloquence parallels the art of building, which Barbaro would consider years later.

The second part of the dialogue opens exclusively with a conversation between Dinardo and Art, which can be understood as gesturing most centrally to Barbaro’s later perspective. By trusting Art in the formation of Dinardo, Nature explicitly declares that her role has been fulfilled. Moreover,
by fading from the scene, Nature is placed in a more marginal role, allowing Art to possess more power, even if this implies the possibility that human actions may somehow endanger the soul. This paves the way for Barbaro’s mature thinking in his commentary, as investigated above.

Manfredo Tafuri suggests that, to understand the evolution of the concept of nature in conjunction with human transformations, it is relevant to investigate Barbaro’s readings of Christian theologians of the 13th century, particularly Bonaventura da Bagnoregio’s. Bonaventura’s writings, according to Tafuri, presented Barbaro with an alternative perspective within Christian thought. This perspective allowed for the conception of human beings as active contributors to the alteration and exploration of the natural world, in contrast to their more passive role in medieval Christian theology.

Bonaventura da Bagnoregio was an Italian theologian and philosopher, who, in *De reductione artium ad theologiam*, defined four types of human knowledge arising from the divine realm. The appearance of the word ‘reduction,’ signalling the hierarchization or attribution of all arts and theology, suggests that divine origin literally lights up those who embrace it, defining a direct connection between God and human artwork.

“Every good gift and every perfect gift is from above, coming down from the Father of Lights, says James in the first chapter of his epistle. These words of Sacred Scripture not only indicate the source of all illumination, but they likewise point out the generous flow of the manifold rays which issue from that Fount of light. Notwithstanding the fact that every illumination of knowl-
edge is within, still we can with reason distinguish what we may call the external light, or the light of mechanical art; the lower light, or the light of sense perception; the inner light, or the light of philosophical knowledge; and the higher light, or the light of grace and of Sacred Scripture. The first light illumines in regard to structure of artifacts; the second, in regard to natural forms; the third, in regard to intellectual truth; the fourth and last, in regard to saving truth.”

The first of these forms of knowledge, said to be enlightened by God, is mechanical art, which is related to all human outcomes; it is followed by sensible knowledge, or knowledge of the natural realm, philosophical knowledge, and the Holy Scripture. This hierarchy is reflected in the spiritual content of what is produced by the forms of knowledge. In this sense, he differentiates human artefacts from entities of the natural realm, ideas and human reflections, which culminate in religious truth.

The art of building is included in the mechanical arts along with six other arts: textile, ironwork, agriculture, hunting, navigation, and medicine. The distinction between applied arts, major arts, and other disciplines had not been theorized before this; nor had the relevance of their distinct contributions to society been considered. By doing this, Bonaventura da Bagnoregio disclosed a clear system of knowledge and interpretation for measuring all human activity, possessing a unique function and dignity in society whilst remaining well-rooted in Christian thought.

The mechanical arts aim to provide pleasure to humans, being conceived as a kind of compensation for their physical shortcomings. Therefore, the ambiguity around the
concept of human fragility is still relevant. On the one hand, the concept of divine knowledge, described as an inner light behind human actions, still confirms the subordinate role of human beings. The idea of fragility emphasises the body of human beings as a limited and corruptible site in Christian thought, which is legitimised by its ultimate transcendence. On the other hand, the weakness associated with human beings also makes space for human initiative and invention within theological discourse. Bonaventura da Bagnoregio’s major innovation lies in this second theory; the traditional idea that divine truth can be understood by alienation from a secular realm is overturned. The earthly world becomes a device, instead of an obstacle, to the knowledge of and in God:

“The first light, then, since it enlightens the mind in reference to structure of artifacts, which are, as it were, exterior to man and intended to supply the needs of the body, is called the light of mechanical art. Being, in a certain sense, servile and of a lower nature than philosophical knowledge, this light can rightly be termed external. It has seven divisions corresponding to the seven mechanical arts enumerated by Hugh in his Didascalicon, namely, weaving, Armor-making, agriculture, hunting, navigation, medicine, and the dramatic art. That the above mentioned arts suffice (for us) is shown in the following way. Every mechanical art is intended for man’s consolation or for his comfort by him; its purpose, therefore, is to banish either sorrow or want; it either benefits or delights, according to the words of Horace: “Either to serve or to please is the wish of the poets.” And again: “He hath gained universal applause who hath combined the profitable with the pleasing. If its aim is to afford consolation and amusement, it is dramatic art, or the art of exhibiting plays, which embraces every form of entertainment, be it song, music, poetry, or pantomime. If, however, it is intended for the comfort or betterment of the exterior man, it can accomplish its purpose by providing either covering or food, or by serving as an aid in the acquisition of either. In the matter of covering, if it provides a soft and light
material, it is weaving; if a strong and hard material, it is Armor-making or metal-working, an art which extends to every tool or implement fashioned either of iron or of any metal whatsoever, or of stone, or of wood.”

Therefore, since any human activity is regarded as an expression of the divine presence, the human activity becomes harmonious with the divine. Assuming this philosophical and theological position, Barbaro’s statement is further clarified. Theoretically, the content seems to correspond with the second part of Alberti’s statement, where this latter pictured the effects of human transformations: sharing products, knowledge, claiming economic and intellectual benefits, encouraging more connections over divisions, all in an effort to improve our “health and standard of living” as well as the safety of the country. Instead, Barbaro seems to summarise this richness by toning down the efficacy associated with architecture, as a “power to act for common good”, which guarantees safe and peaceful cities by organising “uncivilized men.” Such “men,” like nature, find themselves enclosed and protected, instead of their boundaries being opened so as to foster new relationship. In conclusion, when compared to Alberti’s thoughts, who eventually came to define architecture as a good medicine, Barbaro seems to draw more of his understanding from Christian theology. Concerned with logically demonstrating the effective role of architecture in society as a governmental device for the civic body, Barbaro suggests its capacity to overtake and master natural phenomena instead of working in harmony with them.
Within Barbaro’s commentary, Alberti’s ethical reflections seem to be erased. The danger posed by human beings that concerns so much of Alberti’s work is ignored by Barbaro’s thoughts. The nature of humankind is not questioned; on the contrary, human intellectual virtues are enhanced and elevated as divine.

In conclusion, Barbaro puts forward two central and deeply connected ideas: architecture is a kind of a science and nature is a perfectible realm. One is reduced to a function of the other; architecture as a science only makes sense in an account of nature as underminable and imperfect. This opens up new consequences in regard to the understanding and purpose of architecture itself. It is no coincidence that Barbaro’s work does not deal with extremely innovative concepts, but instead responds to a clear political purpose, where architecture is addressed to activate a cultural shift in human understanding and action. The next paragraph aims to establish this and explain its relevant details.

3.3 Venice, the new Rome.

After juxtaposing Barbaro’s ideas about nature and architecture with those of Alberti, it becomes relevant to investigate how these ideas affected the image of the city in Barbaro’s commentary. It is crucial to underscore the cultural milieu in which these ideas took root, as the commentary
was likely shaped by a resurgence of artistic innovation prevalent in Venice during that period. Between the 15th and 16th centuries, Venice emerged as a major hub for publishing in Europe. Although the first printers appeared in 1469, the founding of the Aldine Press by Aldo Manuzio in 1494 marked Venice’s dominance on artistic and cultural fronts. This hegemony was enabled by Venice’s expansion onto the mainland, fostering cultural exchanges across various disciplines since the beginning of the 15th century. As a result, Venice did not just broaden its cultural horizons, it became the amplifier, attracting artists, architects, mathematicians, and favouring the publication of classical texts but also new treatises.

Although historical and archival evidence remains elusive, Tafuri argues that Barbaro’s commentary may have been influenced by his presumed affiliation with the Accademia della Fama, owing to his friendship with Federico Badoer. Despite its relatively brief existence from 1557 to 1561, the Accademia della Fama played a pivotal role in revitalizing Venice’s culture by delving into the study and publication of classical and contemporary authors across various disciplines, including philosophy, science, and law. It also fostered the exchange of ideas from different political and economic realms. Tafuri succinctly encapsulated the essence and objective of the Accademia della Fama as “knowledge and power in an ambiguous Encyclopaedic Association.” However, buoyed by strong ties to Roman ecclesiastical power, its members harboured a deeper agenda to fundamentally reform...
Venice’s entrenched conservative institutions. In this context, the *Accademia della Fama* aspired to establish itself as the depository of “public knowledge;” and it came close to expropriating the prerogatives that the entire patriciate had been guaranteed by the Venetian constitution.”

Considering this Tafuri has argued that the cultural-scientific-political program of the *Accademia della Fama* is reflected in Barbaro’s commentary. This is evident in the philosophical perspective, the scientific contributions provided, and the envisioned role of architecture as instrumental in the political rejuvenation of Venice.

Due to his supplementary observations and references concerning Venice, which were not present in the initial text, one can identify this viewpoint on architecture and its significance in the city within the fifth book of his commentary. In fact, Barbaro left many clues, if not clear references, that unequivocally suggest to scholars that he was always thinking about Venice and its political fate when he commented on Vitruvius’ treatise. In this sense, the annotations represent a most authentic and effective contribution of Barbaro’s work. The content of this work can be considered in correspondence with the sixth book of Alberti’s treatise, as investigated in the previous chapter. Generally, this comparison points to two differences between the works: the narrative sequence that structures the space of the city as well as the types and locations of public buildings that are described.

Within the preface of the fifth book, Barbaro anticipates such issues, listing the common buildings required
within a city; “the forum, the basilica, the aerarium, the curia, the prison (...) the baths, the gymnasium and places for exercise, and finally, the harbours.” There is a narrative break between descriptions of the prison and baths, in order to emphasise the structure of the theatre, as its architectural elements such as stage sets, porticoes, and tiers. Later in the original work, Vitruvius describes the specific role of the theatre, dedicating seven chapters out of twelve to it. This building becomes relevant in terms of providing both a physical and metaphorical point of view.

Vitruvius opens his first chapter with a description of the forum. He speaks about its Greek origins, as well as its traditional square shape and its sorrowing arcades, which were reviewed by the Romans in terms of dimension and proportion, who subsequently added various buildings. Barbaro observes how these open spaces are essential for common city life, and should be categorised into small squares (otherwise known as ‘Calli’ in Venice), composed of streets, canals, and larger squares, all of which are visible in San Marco square:

“It is necessary, beautiful, and comfortable in the city that, in addition to the streets and byways, there be squares and campi (as they are called in Venice) (...) It is good when there are many squares throughout the city, and it is that much more necessary as well as great and honourable that there be one that is by far the main one.”

Alberti’s descriptions adopted a different point of view, walking from the outside, or countryside, towards the inside of the city. Alberti was most likely interested in pro-
viding a unitarian landscape of the city, which had previously been slowly detailed by its external and internal elements, up to the forum. Although the latter was certainly a relevant place, the library, as already demonstrated, was the building which represented the city centre as a symbol of new knowledge for Alberti. In contrast to this, the Vitruvian description, commented by Barbaro, plunges directly into the city, starting from its centre - the square - alongside the theatre, which is conceived as a second main spatial figure of the city:

“But as the treatment of the forum embraced the basilica, the aerarium, the prison, and the curia, so too the treatment of the theatre embraces many things.”

Both places bear the same spatial weight and functionality in the city; they become two gravitational centres around which the people and other buildings of the city turn. However, in comparison with the forum, the theatre evidences a double function across the social and political. Particularly, the stage where plays were performed, which historically provided a social and political display, and its stalls, where people of different social classes could gather, enacted a kind of civic community. For this reason, theatre contributes to what Barbaro described as the “wellbeing of the nation.”

In Venice & Vitruvius Reading Venice, Margaret Muther D’Evelyn extensively suggests how this political meaning can be located in Barbaro’s annotations concerning the positioning of theatre seating:

“Surprisingly the note suggests a more egalitarian outlook that is
usually found among mid-sixteenth-century patrician patrons in Venice. Approving of the mixing of senators with the populace at the theatre during the early Roman Republic, Barbaro seems to hope that more of that spirit will be manifest in contemporary Venice.”54

Barbaro continues this thinking and expands on it further. Within the first chapter of the fifth book, he starts by describing Venice’s crowded squares, labyrinthine narrow roads, balconies, porticos, and *subsellia* (stone benches placed along the palaces’ facades) – as places from which one can see the city as well as be seen within it:

> “Above those (porticos and square) were the stands so that the people could comfortably watch the spectacles. They therefore disposed the forum with a view to its purpose and uses so that if there were many people the square would not be too small, but if there were only a few people it would not appear empty.”55

In this sense, the fixed point of view associated with the Renaissance perspective is multiplied through the city, like a sequence of scenes. In fact, Barbaro extends Vitruvius’s contribution, claiming at the end of the text that Venice, due to its morphological structures and architectural elements, should itself be understood as a sort of theatre.

After this, Barbaro comments on Vitruvius’s principle of harbours, specifically addressing his words to Venice. He explicitly defines the city as a whole theatre, praising its power in reflection of its government, citizens, and city infrastructure, as can be seen in the Arsenale:

> “This creation is certainly not the work of a great empire as much
as it is one of continuous and free governments, and although they did not introduce gladiators into the arenas, actors into the scaenae, or chariots into the circuses, in the Arsenale of Venice they introduced an apparatus capable of acquiring provinces and reigns, and even of removing the will of whose who wished in some way to disturb the liberty of that state.\textsuperscript{56}

The echo of Dante’s praise of Rome, as Margaret Muther D’Evelyn suggests, clearly depicts Barbaro’s intellectual inspiration. Contrary to Alberti, who described the city as an entity connected to external worlds, the metaphor of the theatre suggests a specific strategy for city renewal. This strategy is focused on strengthening an internal unit, centred on Venice and its Lagoon, revitalising the fabric of its social and cultural structures at the same time. This strategy appears perfectly coherent with Venice’s geopolitical situation throughout the mid-16th century, when Barbaro wrote the commentary.

A century earlier, the borders of the Republic of Venice were limited to its coastal strip, from Grado along the East and to Cavarzere on the north bank of the river Po, which was partially covered by lagoon land. Internally, towards the Terraferma, Venice’s territory extended up to Treviso, Padua, Verona, Vicenza, Belluno, and Cadore’s territory in the northwest; \textsuperscript{57} Gorizia, Istria, and the Dalmatian coasts in the east were included some years later. However, following the Peace of Lodi in 1454, which ended the conflict of the previous year with the Duchy of Milan, Venice was able to further expand its domain on the mainland to the west, including cities such as Brescia, Bergamo, and Crema, but except for Mantua’s ter-
ritory. To the south, the Po marked the border with the Duchy of Ferrara, a province of the Papal State (1470-1598). Additionally, Corfu, Zakynthos, Kefalonia, and Ithaca, all on the west coast of Greece, as well as Cyprus, were annexed over the years.

As a result, in just one century, Venice’s territorial structure dramatically changed in the following century, profoundly affecting its political and defensive strategies. Consequently, its borders could no longer be determined only by the natural defences of the lagoon. They required a combination of defensive devices, such as articulating wall systems, as well as political strategies to ensure security in new territories and cities that were often opposed, such as Padua. The Venetian Government was also compelled to adjust their economic strategy to include new commercial routes and areas of investment, as well as their social and legal policies to accommodate new populations. On the one hand, the acquisition of more internal lands extended Venice’s political powers by strengthening its boundaries and confirming its mythic figure as an undefeated city. On the other hand, these new acquisitions disrupted social and economic balance, due to the introduction of new financial and political interests. Interests were previously centred on Venice’s naval domination and its merchant noble class. Many noble families, including Barbaro’s own, which had invested in the agricultural reclamation of lands surrounding Venice since the 15th century, began to desire political and decision-making roles in the city. (FIG. 1 and 2)
Barbaro’s point of view takes shape within this historical picture. The myth of Venice should not have slowed its development, but rather revitalized it through ambitious plans, as were pursued by the Doge Andrea Gritti in 1523. Manfredo Tafuri’s words are particularly illuminating in this sense:

“Under the domain of the Doge Andrea Gritti, the use of authority becomes functional not only for a political project of an aristocratic and oligarchic nature, but also - and mainly - to a vision of the state as a “machine” that demands, in order to assume a non-secondary role in the new European order, fast decision-making, specialization of knowledge and functions of control and direction, and consequent new mental strategies.”

This led to the renovation of a few buildings in the city, including the Arsenale area, as well as an extension of debates concerning the city’s boundaries. Moreover, such strategies exaggerated a political interest in the Lagoon’s well-being, to which Barbaro dedicated a paragraph in the second version of his commentary in 1567.

“Thus, through the exercise of the minds and souls of the senators in an enormous undertaking, he wants the world to see the grandeur of their state, the prudence of men, and their love of serving their country. They will find that the land uses the rivers in this usurpation, and is carried by the rivers into the salt water; they will find that salt by its nature erodes and consumes matter; they will find that the more salt water enters the lagoon the better it is, because going out with great violence it carries some of silt with it; they will find that it is necessary to remove all impediments to nature, so that it can work on its own and do that which cannot be done with any amount of ingeniousness, force, or expense. So they will move the terrain that has become so very hard and facilitate the water in moving it away; they will straighten the canals and courses of water, prevent the fresh water from mix-
ing with the salt water, build embankments and not leave much space. They will also plough and move terrain. Finally, they will move the rivers, large and small, as far away as possible. All these things have been carefully considered by the senators, who have already begun this undertaking, prepared useful and ingenious machines and instruments to carry out the work, and engaged intelligent, diligent people who care about what they do and know how to spend money wisely, since a great deal of money has been designated to achieve these ends.”

Historians believe it quite likely that Barbaro wrote this paragraph after the death of Cristoforo Sabbadino, a Venetian engineer, whose work was fundamental to the founding of hydraulic science. However, their hypothesis that Barbaro’s remarks serve solely as a tribute to Sabbadino’s approach seems unsatisfying. The addition of this paragraph is indicative of how the issue of water management became urgent at this time, and how this problem was seen as not only technical, but also deeply connected with political power and governmental decision-making. In this sense, the subject of water management inhered with Barbaro’s aims to provide new tools for the city’s government. His words certainly represent a warning regarding the state of Venice’s Lagoon, but, above all, an invitation to adopt any kind of rational approach to preserve it, regardless of that which was adopted. There is no evidence that suggests Barbaro knew Sabbadino’s work in any great detail, especially as the latter’s opinions on the reclamation of swamp lands seem quite contrary to the financial interests of Barbaro and his family.

The following reading of Cristoforo Sabbadino’s work will consider the complexity and specificity of his con-
tribution, which was certainly wider than the one conceived, if not exploited, by Barbaro.
FIG. 1 Venetian domination from the 16th century.
FIG. 2 Conquest of Terraferma in stages.
Endnotes

3 Daniele Barbaro was an Italian scholar, interested in mathematics, architecture, and philosophy. He was born in Venice in 1514 and died in Udine in 1570. This commentary was published for the first time in 1567.
5 Ibid., 3-5.
7 Williams, ed., *Daniele Barbaro’s Vitruvius of 1567*, 44.
8 Ibid., 9.
9 Ibid., 13.
10 Ibid., 14.
11 Ibid., 16.
12 “Architecture appears to be close to wisdom, and to reside as a heroic virtue in the midst of all the arts, because it alone understands the causes; it alone embraces the things that are fine and high; it alone, I say, of all the arts participates in the most certain sciences, such as arithmetic and geometry and the others, without which (as said) any art is vile and lowly. Vitruvius therefore seeing architecture in this way, says first that it is a ‘science’.” Williams, ed., *Daniele Barbaro’s Vitruvius of 1567*, 19.
13 “Experience is therefore similar to the tracks left by animals: just as the track is the principle for finding the deer, yet is not a part of the deer (because the deer is not composed of tracks), so experience is the principle for discovering the arts, yet it is not part of any art.” Williams, ed., *Daniele Barbaro’s Vitruvius of 1567*, 14.
14 The metaphysical meaning attributed by Aristotle is not considered in Venetian Aristotelianism. It is a fact that a sort of Neoaristotelism, developed at Padua School, helped to define the cultural background of modern science. However, along with this, multiple contributions, among which Platonism, were crucial. Eugenio Garin, *Aristotelismo Veneto e scienza moderna* (Salerno: Antenore, 1981), 13.
Branko Mitrovic, within his essay on Paduan Aristotelianism and Daniele Barbaro’s Commentary on Vitruvius’ *De Architectura*, explains how Barbaro was able to combine Platonic abstract concepts with the Aristotelian theory of four causes: “A way to introduce separately existing abstract en-
tities into Aristotelian philosophy was through formal and final causes by claiming that these two types of causes enable the reflection of separately existing abstract Forms in the material world.”


15 Williams, ed., Daniele Barbaro’s Vitruvius of 1567, 45.
16 Ibid., 44.
17 Ibid., 44.
18 Ibid., 63.
19 Ibid., 730.
21 This name is the result of a combination of Di-o (God), Na-ture and Ar-t, and do-nation, Di-na-ar-do. He represents the embodiment of the soul in a human body.
22 (Translated by the author). Barbaro, Della Eloquenza, 1.
23 (Translated by the author). Ibid., 1.
24 (Translated by the author). Ibid., 3.
25 (Translated by the author). Ibid., 3.
26 “But a greater admiration towards me, when the food on which one lives, it so often makes one in a bad mood, so that it leads to death. (...) so let the offense be, prone to be harmful, or then nothing more.”
(Translated by the author). Ibid., 3.
27 (Translated by the author). Ibid., 4.
28 (Translated by the author). Ibid., 4-5.
29 “Barbaro describes nature as a horizon that human activity must approach with a double attitude: recognize nature’s divine and rational harmony and conquer it to meet civil needs when it is hostile. Art is called to overcome nature, therefore. This is not a contradiction or a “confusion of meanings” but a conception adhering to patristic and medieval interpretations. Barbaro’s double attitude towards nature is rooted in Bonaventura da Bagnoregio’s works.” (Translated by the author)
30 He was born in Bagnoregio in 1221 and died in Lion in 1274. The text was written around 1255-1257.
32 Saint Bonaventure, De Reductione atrium ad theologiam, 21-22.
33 “… A wondrous thing is the power to act for the common good, to
gather uncivilized men and lead them into religion and sure discipline, and make them peaceful in cities and fortresses, and then, with more violent force against nature, cut through boulders, tunnel through mountains, fill the valleys, drain the marshes, build the ships, straighten rivers, fortify the ports, construct bridges, and surpass nature in those things in which we are by nature surpassed: raising immense weights; satisfying in part the desire for eternity; delighting those who do not build, and so much more those who do; ornamenting the empires, the provinces, the world.”

35 Williams, ed., *Daniele Barbaro’s Vitruvius of 1567*, 44.
36 It is worth noting that the commentary by Daniele Barbaro of *Ten Books of Architecture* by Vitruvius was already anticipated and published by other authors, such as Giovanni Sulpicio da Veroli who published it in Rome in 1490; Giocondo da Verona who curated another edition in 1501 published in Venice, which was followed by another one curated by Cesare Cesariano in 1521. However, according to Andrea Paribeni, the translation of Vitruvius, promoted by Raphael around 1514, constituted the best example of the applicative spirit with which the architects of the early sixteenth century they look to Vitruvius. The relevance of Barbaro’s commentary, however, lies in its additional political purpose.

39 For instance, Padua’s artistic environment influenced Giovanni Bellini, Titian, and Giorgione’s paintings. Milan, Rome, and Florence’s architectural environments affected the entrance of new ideas and architectural approaches.

40 See Frederick Hartt, *History of Italian Renaissance Art*, 387- 424. On
41 For instance, Mauro Codussi, who brought the influence of Brunelleschi and Leon Battista Alberti. Also, in their theoretical studies, Jacopo Sansovino and Sebastiano Serlio brought new ideas and the influence of Rome’s environment.


See the chapter “Civic Architecture” and “Sacred Buildings” in Norbert Huse, Wolfgang Wolters, Art of Renaissance Venice: architecture, sculpture, and painting, 1460-1590, 16-104.

42 For instance, the mathematician Luca Pacioli taught at Accademia di Rialto in Venice, and at the end of the 15th century, published his Summa de Arithmetica, Geometria, Proportioni e Proportionalità.

43 I sette libri dell’architettura by Serlio was published in Venice in 1537, which highlighted Donato Bramante, Raffaello’s works, spreading out their works even more. On the Art of Building in Ten Books by Alberti was published and illustrated by Cosimo de Bartoli in 1550 broadening its knowledge beyond the elite of artists. See Nicola Aricò, Il De re aedificatoria secondo Cosimo Bartoli (Verona: Leo S. Olschki, 2011).
44 Federico Badoer was a well-known politician in Venice, but even a relevant and active refined intellectual. See Tafuri, Venice and the Renaissance, 114.
45 Formally, it was closed due to fraudulent bankruptcy, but according to Tafuri, there are profound political reasons behind this decision of the Venetian Senate. The academy brought political instability to Venetian society due to its ties with Rome, which was too risky to maintain. See Tafuri, Venice and the Renaissance, 114.
46 Tafuri, Venice and the Renaissance, 114.
48 Tafuri provides an extensive description of Barbaro’s scientific contri-
butions in the margin of the ninth book of the Commentary.
49 “We have no proof that Daniele Barbaro belonged to the Accademia della Fama, but we are certain about his friendship with Federico Badoer. And the Vitruvian commentaries that the Patriarch elect of Aquileia published in 1556 were in a certain sense connected to the cultural program laid out in the Accademia’s editorial prospectus: they were at least congruent with it, revealing one of the goals held by the Venetian scientistic circle around the middle of the sixteenth century.”
Tafuri, Venice and the Renaissance, 119.
50 Williams, ed., Daniele Barbaro’s Vitruvius of 1567, 333.
51 Ibid., 340.
52 Ibid., 361.
53 Ibid., 362.
55 Williams, ed., Daniele Barbaro’s Vitruvius of 1567, 343.
56 Ibid., 443.
57 Treviso is a city that is about 27 km from Venice.
59 Williams, ed., Daniele Barbaro’s Vitruvius of 1567, 444.
60 He was born in Chioggia, where he also died in 1560.
4.1 A new body for Venice.¹

As mentioned in the previous chapter, Venice and the *Terraferma* experienced a wide range of political, economic, and social changes between the 15th and 17th centuries, prompting one of the most significant land and hydraulic management projects in European history. The sheer scale of these transformations is significant, as well as the place where they happened: Venice. During this period, the landfill process marked the most relevant phenomenon in the lagoon. Due to its fragile ecosystem on which the life of the city depended, any change close or far from Venice could produce quick and destructive effects, undermining it. In this sense, it represented an early gauge for detecting the effects of human beings on their environment.

However, these effects also led to increased investigations into the health of its ecosystem, as well as attempts to regulate the human activities that endangered it. *Harmony* and *conflict* are considered the most appropriate terms to describe the complexity of the factors involved in these transformations of the environment. Some of these factors were inherent to the geomorphological nature of the region, while others were political, economic, and social.²

A first factor concerned the geology and hydrology of Venice’s territory. The management of Venice’s territory included the care and regulation of rivers, the sea, and canals, but also encompassed the intertidal area, *barene*, consisting
of mud, swamps, and reeds, which are, by nature, a mix of water and soil. In these areas, water is always in close association with the land. Therefore, the management of water was simultaneously also the management of land, and vice versa. Moreover, one must consider the overall shoreline that includes Venice, its surrounding territory, and the delta of the Po, which is the outlet to the Adriatic Sea for many rivers coming from the Alps. The river Po flows from west to east through the Pianura Padana, collecting many rivers from the Alps in the northern region, before flowing into the Adriatic in the southern region of Venice. Therefore, Venice’s territory is the final point of complex hydrographic systems that, interested distant territories governed by different political institutions at the time, such as Milan and Savoy, compounding the complexity of its water management. (FIG. 1)

Orographically, the terrain is characterised by a complex pattern of valleys and depressions, which become increasingly articulated towards its mouth. From the north to the south-eastern sides of Venice, other rivers, such as the Piave, Sile, Brenta, and Adige, contribute to the complexity of the orographic setting of this area. There are also significant differences in the quality of the soil on the upper north-western side of the Po, which is mainly composed of large gravel, allowing the presence of water canals and springs for agricultural use. Between the centre of the river and its eastern end, the soil quality changes, becoming less permeable, and resulting in excess water accumulation that leads to swamps and disruptive floods. Taking all this into account, it is un-
FIG. 1 Map of Italy and its hydrographic system in 1853.
derstandable why Venice’s territory is vulnerable to extreme weather events and climate change. For example, between 1550 and 1850, the climate was unusually cold, otherwise known as the Little Ice Age. This caused instability in precipitation, resulting in severe flooding, which adversely affected crops and food reserves. Thus, a knowledge of appropriate water management and the development of effective approaches played a crucial role in protecting Venice and its fragile lagoon.

A second factor that influenced human interventions in the landscape pertains to the political and economic, following specific historical events, such as the Peace of Lodi, which established a stable dominion for Venice on Terraferma. On the one hand, this agreement expanded the territorial boundaries of the Republic, incorporating new territories and increasing interests in the Terraferma as an economic resource. On the other hand, these changes destabilized the isolationist political structure on which the mythological foundations of Venice were based. In fact, prior to the annexation of Terraferma, the city was built around the lagoon as well as on a small coastal area. Venice’s social and political structures were built by a long-term balancing act between public and private interests, which were constructed between “concordia et unanimitas”, and an economy based mostly on maritime trade.

These changes also influenced the legal organisation of the land, both within and outside of the city. Historically, Terraferma had strong ties to Roman culture, which served as
the primary source for setting the law of the land. Since the beginning of the 15th century, after their conquest, Terraferma’s territories were never fully able to accept the Venetian approach, which was tailored to the city first and then applied to the rest of the Republic.⁵

Moreover, the composition of the population was affected in many ways. Social hierarchy changed as Padua’s nobles were replaced by Venetian aristocrats. The density and distribution of the population in different parts of the region shifted, especially as a result of migration from the city into rural areas.

Therefore, the tensions between two conflicting interests had been developing for some time. On the one hand, there was a wish to preserve the city of Venice, its lagoon and maritime tradition, along with its aristocratic structures; on the other hand, officials desired to increase Venice’s economic and geopolitical power, expanding agricultural activities on Terraferma and renewing its social structures. Thus, geopolitical, and ecological issues were intertwined throughout the entire territory.

Water management had been an important activity in Venice, even preceding 1324, when the Republic instituted a specific committee, Collegio delle Acque. This committee, headed by four Savi and Proti, played similar roles to the Giudici del Piovego, which formed a judicial branch, Provveditori dei Comuni.

According to Dennis Romano, before the formation of these institutional bodies, tasks such as canal cleaning for
better navigation and street upkeep were independently carried out by each parish, forming a unified island governed by two or more patrician families. Following the 12th century, the political structure became more permeable to patricians and the economy began to be based on maritime trading, rather than fishing, salt extraction, and small agricultural activities. As a consequence, the city’s structure and community dynamics evolved. By building a solid and permanent bridge and a street parallel to the canals, the city adapted to meet new needs. The parish community developed a more flexible and permeable social structure requiring more central and public intervention. The activities of maintenance and cleaning entrusted to each parish were now organized by public “officials known as capi di contrada”, who managed each parish or contrada.7

Despite these statutory changes, activities remained based on parish units and direct contact with residents was maintained. It is worth noting that capi di contrada were selected from patricians residing in contrada or sestiere, including popolani who were elected for specific roles, such as the signori di notte, “Venice’s Lords of the Nightwatch.”9 According to Nelli Vanzan Marchini, whilst provisions were enforced by these officials, it was the citizens that were expected to maintain the city on their own: “The need to defend Venice’s cleanliness, rather than coming from an external aspiration to hygiene as beauty, seems to be determined by the belief that the health of the individual coincides with the health of the amphibious habitat, and by the awareness
that the survival of the city is inextricably linked to the health of its lagoon. The fact that the Jews also adopted and shared those ecological and sanitary practices established outside the Ghetto, indicates that knowledge of the environment and respect for it was rooted in the ancient Venetian’s behaviours and widespread throughout the centuries.”

With Venice’s transition to a city structure and centralized institutions, the commitment to preserving the delicate urban environment didn’t wane; it became enshrined in laws, emblematic of a civic sense prioritising the common good over private interests.

With the conquest of Terraferma by Venice during the 15th century, “a new era began.” Following the expansionist drive of Doge Francesco Foscari, and with the annexation of Padua (1404-1405), the term ‘lagoon’ came to signify a wider territory than was previously seen in the history of Venice. This extended an ever-growing need to protect the common good of the lagoon in relation to its newly expanded geography, however, also intensifying, even in this aspect, the tensions between Terraferma and the Dominante.

The short text entitled Dello stato della città di Venezia per la negligenza e disobbedienza dei suoi cittadini, written by Marco Cornaro around 1450, appears as one of the first written accounts that evidences the entanglement of geopolitical and ecological tensions in Venice’s history and the specificity of the approach adopted by Serenissima. In the text, Cornaro points to the “carelessness and disobedience” of citizens as causing the degradation of Venice’s territory -
the illegal closure of canals, the slowing of water, the abandonment of soil used for the foundations of homes, and the unloading of materials directly into the canals: “the roads that used to be swept up and cleaned every Saturday are not taken care of today (...) Everyone throws their trash publicly and lets them get filthy in the water.”

Instead, Cornaro encourages all Venetian citizens – both of the city and the mainland – to act according to an “idea of community that all Venetians are urged to recognize and share.” The responsibility of a community to take care of its territory - a perspective that has emerged in recent years following the concerns of environmental ethics - seems already represented here, in a fundamental practice of environmental protection, even if for civic defence.

Therefore, Venice was forced to resolve these tensions through the renewal and strengthening of multiple medieval city management institutions, turning them into an innovative system that included water management as a priority, as well as other environmental aspects. As a result, the institute of the Magistrature delle acque was established in 1501, as a permanent legislative body of the Collegio dei Savi that included Savi esecutori, three senators (without voting rights), and which was dedicated to the promulgation of new laws, regulations, and prohibitions.

Compared to other cities that adopted similar public institutions and regulations, the Venetian institution equipped itself with multiple experts and political members who were carefully appointed to serve the public realm. In contrast,
Rome was largely influenced by ecclesiastical powers, which controlled comparable institutions, but which contained far fewer experts, who were appointed for specific interventions only.

The autonomy of Venice’s institute was guaranteed by the election of members without land and monetary interests within the lagoon. *Savi executori* were regularly supported by a group of technicians who oversaw the supervision and planning of safety measures in the protection of the wider territory of the Republic.

Although it cannot be denied that Venice’s interests were always preferred to those of external territories, this kind of careful approach to the territory continued systematically and successfully until the end of the Republic in 1797, when other factors, such as industrialization, and the new political order uniting Italy in 1861, led Venice to alter its approach.

In this sense, the management of water, and the whole apparatus designed around it, provides a distinct historical example of how some policies applied in the Venetian territory can be considered an ecological approach *ante litteram*. One of the main protagonists in this narrative of an emergent ecological approach was Cristoforo Sabbadino.

4.2 Cristoforo Sabbadino, *Discorsi per la Laguna di Venezia*.

Cristoforo Sabbadino’s contribution to Venice’s water
management system is mainly preserved in written form, in his *Discorsi per la Laguna*, published around 1540, and expanded upon later in the reports of his activities as *proto* for the Republic of Venice. Throughout this period, his activities were mainly concentrated on stemming the threat of landfill processes to the lagoon; draining the marshy parts of the lagoon weakened the natural defences of the city and, therefore, this phenomenon made it easier to attack Venice from the mainland. While Marco Cornaro was the first to describe Venice and its surrounding territory as an ecosystem with rivers, canals, valleys, mountains, and forests, it was Sabbadino’s work that marks a real U-turn.

*Discorsi per la Laguna di Venezia* is divided into two parts. In the first, Sabbadino extensively explains the three main causes that threaten the lagoon because of landfill processes. The second part of the text is dedicated to his proposed solutions, provided along with a series of coloured maps and drawings of the project. Before this, however, he provides a brief description of the lagoon’s historical origin, and its geological formation. The work cannot be considered technical-scientific, due to the lack of any theoretical principles or mathematical calculations; instead, Sabbadino bases his ideas on his own direct experiences of the lagoon. Nonetheless, his work marks a first attempt, even if empirical, to systematically organize thoughts, actions, and techniques in the planning of necessary interventions for the environmental protection of territory.
It is interesting to notice how this empirical approach is accompanied by poetic nuance. Several authors who can be read in terms of the Arcadian discourse share this blending of a poetic wonder for nature, as well as naturalistic, proto-scientific, and even scientific, observations.\textsuperscript{22} The text begins with a sonnet, which demonstrates Sabbadino’s passionate interest in the places where he was born as well as those he came to know thanks to the teachings of his father, Paolo Sabbadino:

“You know how great your walls were. 
Venice, now you can see how they look. 
If you do not do it, 
you will find yourself deserted and without walls, 
and rivers, seas, and human beings as enemies. 
When you find them, you don’t believe it. 
Do not hesitate, open your eyes and move your feet. 
As time goes on, you won’t be able to. 
Dispel the rivers around you. Slow down human greed. 
And then from the sea, left alone, thou shalt always be obeyed. 
Don’t be deaf. 
For this great reason, I can affirm that heaven gave you eternal life in the waters.”\textsuperscript{23}

From its first lines, we can understand that Sabbadino’s object of concern is the state of Venice’s health. The specifics of Sabbadino’s concerns seem to be not so much about the environmental effects of the silting process in terms of health and hygiene, producing toxic air through the draining of mud at the bottom of the canals. Rather, Sabbadino’s main concern is of a more defensive nature.

Venetian walls, as described in the first line, corre-
spond to the lagoon itself. This body of water divides the island from the *Terraferma* and has historically provided a natural boundary for protecting Venice’s fortune and security. Its destruction would make the city more vulnerable and lead to its death, as a “deserted” or uninhabited wasteland.

The accent could confirm Barbaro’s view, reducing Sabbadino’s contribution to a purely political one. Contrastingly, by expressing his concern by turning to Venice as if it were a person, by way of a common anthropomorphic metaphor to describe the lagoon, he demonstrates how much more valuable his contribution has been historically.

Its use is not purely functional in the poetic tone of his writing, but rather gives a sense of Sabbadino’s cultural perspective. The anthropomorphic metaphor is almost certainly influenced by the Platonic vision of the Cosmos, as described in the relationship between microcosm (human being) and macrocosm. This classical reference, quite common in Western culture until the 16th century, signifies an epistemological pair representative of a series of qualitative analogies, correspondences, and interconnections, that synchronize thinking and cultural processes in support of a cosmological perspective in which humans and nonhumans are still intimately intertwined. Philippe Descola defines this “specific style of relations with the world” as an analogical ontology, being expressed by metaphorical and metonymic tools.

The sonnet is not an exception. In fact, the same narrative device is consistently used throughout Sabbadino’s text:
“This lagoon was, in fact, fabricated by God to save the grateful city of Venice, which sustains faith in Jesus Christ. It is similar to a human body with a head, arms and legs, with a heart inside, liver and lungs, with flesh and bones, nerves and veins, which have been provided with a healthy life. The head is the place where the shores are situated; and the arms are towards the sea, it is something to live on, and the harbours are food supplies; the legs, which enable it to stand firmly on its feet, are the canals, lakes and basins of salt water, situated in the peripheral part of the lagoon itself, in the reed beds and toward dry land. The heart is the city of Venezia. The liver to the right is the city of Chioggia. The lungs are the counties of Torcello, Mazzorbo and Burano. The veins are the canals inside the body in the centre of the lagoon. The flesh, bones and nerves are the bottoms of the lagoon itself, in their different conformations. If the will is to maintain this body alive, beautiful, healthy and gangly, it is necessary to save it as a whole, with all its limbs both inner and outer, and to feed it continuously, and also to keep its breath healthy, good and odoriferous.”

The expression “it is necessary to keep it whole” is surprising. It indicates how effective, in terms explained by Descola, the application of an anthropomorphic image is in determining an understanding of the functioning of Venice and its territory as an interconnected system, which we would today call an ecosystem.

The image of the lagoon as an anthropomorphic entity shines through with even more strength in a series of Sabbadino’s drawings, where it is described as a vibrant substance possessing perfectly comprehensive, rich, and varied systems. On the one hand, his maps exhibit a kind of geometrical accuracy. On the other hand, they still display a hidden vitality that could only be captured by someone familiar with these places, who had experienced them and wished to convey their qualities beyond quantitative features. Starting from
his site-specific observations, through drawing on familiar experiences and utilising his life-long knowledge, Sabbadino translates this information into representations, painting with a unique technique that had never been used before. Whilst diagrammatic, his maps are also intense in colour and texture, marking out relevant elements of the lagoon based on function and characteristics. However, colours are not used symbolically as in today’s cartographic code, but rather as tools through which the lagoon’s vitality is envisioned.

Although he drew several maps, there are two that seem most representative of his approach. The first map frames the coastline between the Bacchiglione river in one direction, shaping the lagoon to the south and flowing into the sea under Chioggia, and the Piave river, which flows on the opposite side to the north. In the other direction, towards Terraferma, the drawing extends as far as Padua and Treviso. (FIG.2)

The technique that Sabbadino used to represent water in his maps is surprising; the sea is coloured blue, textured with small waves which simulate movement and currents. This appears in stark contrast to the flat, calm water within the lagoon which is represented with a green-blue consistency. Simultaneously, numerous dark blue water lines (the rivers) engrave both surfaces, crossing in and out of the lagoon. Drawing the waters accurately was necessary to describe their nature and characteristics and, above all, their mutual connections. The same care was applied to representing Venice’s natural wall. Here, he draws the barene (saltmarshes) along
the coast, coloured with a white background, as well as the marshy areas, with a slight hatch to mark out their different consistencies compared with *Terraferma*, in orange.

The second map frames a wider territory, including the region up to Modena on one side, and Trieste on the other. (FIG.2b) Here, Sabbadino gives more attention to the richness of *Terraferma*, being made up of rivers and canals, coloured in dark blue, and flanked by rows of trees on a white background, which represent the land. In contrast to the first map, Sabbadino also accurately draws a few small city centres, marked by single red buildings scattered across the territory and connected by roads, which are marked out by a warmer yellow and also flanked by rows of trees. The representations of rivers, canals, roads, and cities weave a dense texture, made up of vertical lines that lead towards the sea, in which the dark blue rivers are visually predominant. Sabbadino’s intent to primarily highlight the hydrological structures of Venice’s territory, instead of those on land, is quite evident. Between these lines, tiny religious buildings, coloured in red, punctuate the territory. Further away, towards the mountains, a few forests are painted as large green spots, representing their abundance and density. However, looking closer, these spots are surprisingly made up of a series of repetitive lines that look like small hills with a tree on the top.

Today, Sabbadino’s maps possess all the characteristics described by James Corner in his revision of mapping practices. Beyond the practical and political implications of Sabbadino’s maps, they allow a reading of covered realities,
FIG. 2 Cristoforo Sabbadino, Venice lagoon’s map, 1556.
FIG. 2a Cristoforo Sabbadino, project for the rivers’ diversion in the Venetian territory, 1552.
FIG. 2b Cristoforo Sabbadino, map of Venice’s lagoon and its hydrographic system, 1558.
unseen and unimagined, as hidden traces of living in context, or a sense of place. 29 Like anthropomorphic metaphors, these maps are analogous and operative tools that do not merely describe reality as it exists. Unlike abstract and codified modern mapwork, Sabbadino’s use of colour and symbols provides a more complete and vital sense of these places and the care they require. Thus, I suggest that this approach is representative of an ecology of maps.

Although scarce in comparison with the abundance of maps, Sabbadino also provides a few technical drawings, such as those of measuring instruments. Among these, “la figura lunare,” represents a diagram invented by Sabbadino that visually explains the interaction between the sea tides and the Moon’s phases. 30 (FIG.3) While the anthropomorphic metaphor was utilized within the text to explain the whole lagoon in linguistic terms, and colours were used in maps to convey its vitality, in these drawings, the continuity of lines between the moon and the sea attempts to convey the invisible connection between these two elements. In this drawing, “the whole” does not only encompass the ground but also extends to another dimension, the sky. Words and graphical materials become more than technical tools; they seem to test and transform the limits of tangible and intangible connections.

As anticipated in his sonnet, Sabbadino’s main text presents an investigation of the “three enemies” of the lagoon: the rivers, the sea, and human beings. His observations start from a crucial assumption: the lagoon’s degradation is due to the coexistence of these factors, which not only add to each
other, but also increase exponentially the landfill process. To suggest this concept, Sabbadino uses the expression, “conspiracy among the three enemies,” as he again addresses the city as a person, and a victim.\textsuperscript{31}

This observation is, once again, a natural consequence of Sabbadino’s vision of the lagoon as “a whole,” as explained above. Inheriting the Platonic conception of the Cosmos expressed within \textit{Timaeus}, Sabbadino understands the stable balance between parts as constitutive of the whole body’s health.\textsuperscript{32}

Therefore, the most effective remedies are concocted by looking at the lagoon as a complex system, made up of the city of Venice and its surroundings as an interwoven whole. Starting with territories on \textit{Terraferma}, mapping up to the mountains on its western side and then, on the other side, investigating tidal movements and wind directions, it allows Sabbadino to grasp the complexity and specificity of Venice’s geography.

However, looking at these phenomena by themselves would not be enough to fully understand the causes of the lagoon’s degradation; there needed to be an additional investigation into the effects of human transformations on the territory. In this regard, Sabbadino is noticeably clear: none of the causes are solely responsible or sufficient for fully explaining the effects of the landfill process. Within the text, he provides a few examples that focus on the mutual interactions between phenomena.

Historically, the natural balance between the sea’s
saltwater and the river’s fresh water had kept the size of the (salty) lagoon sufficiently large enough to avoid the landfill process, regularly flooding parts of Terraferma in muddy areas, called velme or barene. Thanks to such buffer zones, the rising and falling of the tides had cleared up the harbour and canal beds. On a surface-level of understanding, one of the first causes of the landfill process arose when rivers transported various materials into the lagoon. However, this dirty water was not a natural feature, but rather a result of human interactions. Diversions of rivers were calculated based on political and economic reasons. Against the tides, arzeri (embankments) were built up to protect territories from sudden flooding, as further changes on Terraferma overtime transformed it from swampland into meadows and agricultural fields. Due to these changes, the natural balance was disturbed, materials were transported downstream, and the speed of the water was changed, resulting in a dramatic impact on landfill processes. Sometimes, the current poured violently into the lagoon, whilst at other times, it flowed slowly, preventing the exchange of water. In these senses, Sabbadino’s description of the Adige appears paradigmatic:

“The Adige River (…), for its very long course and its passage through valleys and reeds, has its water very clear, and also because on both sides, it has very low banks. During the floods, it expanded, crossing banks, valleys, and low places, leaving its sand behind. As a result, after flowing downstream, the water came back very clear. As a result of adding soil to the area and raising its banks, it appears that the lagoon’s water has a higher level of river turbidity.”

As already mentioned, Sabbadino’s contribution is
FIG. 3 Cristoforo Sabbadino, the lunar diagram, 1550. This drawing explains the motion of the tides inside the lagoon.
relevant because it evidences an intent to observe natural phenomena in their complexity and mutual interaction, thus allowing him to provide appropriate solutions that protect the environment. In this instance, the sea, “which alone would not have caused the ruin of the lagoon,” comes to aggravate the landfill process, instead of interacting positively with the rivers as it used to. Its sand, for example, described as light and always in motion, flowing in and out of the lagoon, would become mixed with “fat and heavy” soil, compacting at the bottom of the canals. This would create a hard substance that would not be carried away by the sea currents, instead having to be removed manually. The same phenomena damaged the swampland surrounding the lagoon, changing the nature of its soil and vegetation, and affecting its function as a natural buffer zone that protected Venice. What appears evident is the active role that humans played in this destructive process. Sabbadino does not fail to list the people who are responsible for this, identifying “landlords, engineers, and other citizens:”

“The noble citizens of this city planned the waterways according to their particular benefits, without consulting the citizens. This is what has ruined the lagoon. Noble citizens employed engineers under their authority. Some of them, hoping for future commissions, diverted the waters where noble citizens wanted them to flow.”

Landlords and noble citizens pursued their own economic and political interests “without consulting the citizens.” This expression is particularly interesting, reminding us of the core of the issue: the balance between private and public in-
terests as a fundamental principle for maintaining the health of Venice and its territory. Denying this principle would have meant the ruin of the territory.

Sabbadino is no less severe in his treatment of the second group, engineers, even though he himself was a river expert; he was critical of those who, surrendering to political power, authorised incorrect river diversions in the hope of gaining favour and further employment. Additionally, many engineers, especially those hired from countries like Lombardy, possessed different knowledge and showed extraordinarily little understanding of the lagoon’s system, unlike those who had always lived in and known the place.  

Despite all this, there were many who still preferred to protect and develop Terraferma at the expense of the lagoon, not understanding, or being unwilling to understand, the needs of the ecosystem. This is the case with the spread of mills through the northern territory of Venice, close to Mestre. Economic interests in increasing their number led authorities to engineer excessive river channels and diversions, modifying the landscape and its hydrogeological balance. Sabbadino reports that the effects of this were clearly evidenced by the state of the lagoon and the structures of surrounding waters.

Despite this, many engineers, instead of “dismissing the mills, (...) modified canals,” and thus continued the extent of the damages. The damage was such that Sabbadino appeals to the help of a “valid doctor to save” the lagoon, applying again the rhetorical figure of the city as a sick organism that needed healing. For Sabbadino, the damage caused by
the excessive spread of mills on Terraferma was most evident and, echoing Marco Cornaro’s arguments, he was able to clearly see the entanglement between landfill processes and the exploitation of the mountain forests. During flooding, trees acted as a filter and area of sedimentation along riverbanks, preventing a large amount of soil, trees, and debris from moving downstream towards the lagoon. The case of the Adige, once again, appears as a representative example:

“How many were and are the damages and ruins caused to this lagoon by humans (...) for their particular benefits? In order to convert valleys into their possessions and woods into ploughed lands, those that bordered the Adige have occupied many meanders along which the majority of the river’s water drained. And the water, which was very clear earlier, is made very turbid. (...) And what did humans do? To turn the valleys into agriculture they worked on them so much so that the riverbanks rose and closed their meanders, and the river was no longer able to lay anywhere, leading all debris and turbidity to the sea.”

Marco Cornaro and Sabbadino correctly sensed that agricultural transformations undertaken by private landowners represented a major cause of forest degradation and the landfill of the lagoon. However, Proti did not mention other factors that had historically contributed to the decline of forest areas, such as their exploitation to obtain timber for other purposes, in which the Republic was fully involved. This was extensively used for strengthening the sea, canals, and rivers, through embankments (palificade) by piling. The care of rivers and canals were not only necessary for the preservation of the lagoon, but also for the efficient movement of
materials, such as stones and timber, which were directly sold as raw matter.

According to Cristoforo Tentori, new excavations took place at the Cava Caligo, Cava Cavallino, Cava Gradena, Cava Marghera, and in Mestre, in order to facilitate merchant trading with the Continente. These were “diligently excavated” to aid navigation, including embankments and stone palada (stairways), and once works on the canals were completed under the supervision of the Magistrato delle Acque, their maintenance became the responsibility of local government.

Timber was also essential for building the foundations and other elements of the city’s waterscape, such as palina, bricola, and dame, as well as defending the city’s boundaries in the construction of ships. Moreover, the forests that ran along the Adriatic coast, from Istria to the hills and mountains surrounding Venice, such as the Tagliamento forest, provided firewood for the city and Terraferma. Further large amounts were required to operate the furnaces of the two most significant mines, Agordino and Zoldano. In fact, together with minerals, a large amount of timber was consumed in the manufacturing process. This led to the extensive exploitation of these reserves, which was evident as early as the beginning of the 18th century. Much of Montello Forest, rich in oak trees, was felled to provide raw material for the construction of ships and foundations, whilst Cansiglio forest, composed mainly of beech trees, supplied the resource used in the production of ship oars.
One indication of growing awareness regarding the vulnerability of these valuable resources can be seen in the first law, enacted in 1472, concerning the conservation, use, and protection of the woods of the Republic. The establishment of a buffer zone of forests and meadows for about 2000 meters along the lagoon, which prohibited land reclamation for agricultural purposes, was one of the most important acts passed during the period.

River diversions, the overspread of mills, and the forests’ exploitation were the main damages caused by human beings that were listed by Sabbadino. After these, many others follow, such as the reclaiming of many swamp areas close to the lagoon in order to exploit them as grasslands for cattle and other agricultural purposes. In fact, this process required several artificial practices, such as raising riverbanks to protect the surrounding fields from flooding. This cut off the land from natural swamp vegetation and reeds, which inevitably reduced the buffer area that otherwise stopped the sea’s expansion. Sabbadino continues, critiquing the high diffusion of fishing valleys and vegetable gardens, which cause just as much damage. His work shows a rare understanding of the lagoon and the essential function of each living member within it, as well as an awareness of the effects of human intervention on the balance of the lagoon’s ecosystem. As a direct result of this remarkable analysis, Sabbadino carries on, providing a few “very useful and infallible remedies” in order to save the lagoon. As mentioned in the last section of his sonnet, the correct diversion of rivers was at the core of his
strategy for slowing down the landfill process, bringing the landscape back to its divine origin, “eternal among waters.”

Whilst Sabbadino admits the rivers cannot be considered alone as the real cause of the landfill process, he does argue that their appropriate diversion represents the only solution to stopping the lagoon’s decay. (FIG.2a) He proposes to move the “Adige, Brenta, Musone, Sile, and Bachion” as far away as possible from Venice and its main harbours. Moreover, instead of making them flow into an existing port, Porto di Brondolo, Sabbadino suggests the building of a new harbour, dedicated to filtering out rivers to sea without impacting the existent harbour, as an essential site for Venice’s merchant activity. Sabbadino’s opinion here was based on his observations of what was occurring at Chioggia’s harbour, located at the very south side of the lagoon.

4.3 Cristoforo Sabbadino and Alvise Cornaro: perspectives on Terraferma.

Sabbadino’s apparent clarity of thought did not mean he was not also faced with difficulties when trying to develop shared solutions with experts, political powers, and citizens. These individuals all represented their own, often opposing, interests. One cannot ignore the fact that Sabbadino’s contributions were also developed in response to numerous requests from private individuals to the Collegio dei Savi, where Sab-
badino was appointed as a technical representative. One of the most well-known discussions that took place here during this was between Cristoforo Sabbadino and Alvise Cornaro.\textsuperscript{51}

The debate between the two is notable for two reasons. First, it provides a substantial amount of historical evidence, which effectively illustrates the diversity of political, economic, and cultural factors that shaped the period and the authorial intentions of both. Sabbadino conducted his investigations in his role as a \textit{Proti}, whilst Alvise Cornaro was a Venetian scholar of noble descent, whose title was never ratified by the Republic. For this reason, after finishing his studies and abandoning any hope of attaining a noble title, Cornaro settled permanently in Padua where his uncle, Angelieri Cornaro, owned many areas of land that had been left to him upon his death. In addition to promoting the reclamation of his land in Padua, Cornaro showed interests in the arts, agriculture, literature, and theatre.\textsuperscript{52} He wrote several works, including hydrological texts, one titled \textit{Discorso delle provision de la Laguna e altri scritti}, which resulted from his requests, counterproposals, explanations, and conclusions derived in discussion with Sabbadino. He also authored a treatise on architecture, entitled \textit{Discorsi intorno alla Vita sobria}, and another on agriculture, though records of the latter have since been lost.\textsuperscript{53}

Sabbadino and Cornaro's debate was dominated primarily by two arguments: those concerning the Venetian defence project versus opposing views regarding the reclamation of land. Surprisingly, both Sabbadino and Cornaro shared
similar concerns; Venice was in danger of continued landfill due to its river structures, which needed to be diverted rapidly to avoid the total destruction of the city’s natural defensive wall. However, their proposals differed on the nature of such walls for Venice.

Even though other cities on the mainland had already been affected by vast defensive works since the beginning of the 16th century, the debate regarding the Venetian walls involved many more aspects than just defence. It involved the essence of the city. For this reason, the debate presented this controversy beyond local historical fact, encompassing several political, economic, geographical, and environmental concerns whilst also refusing to abandon the artistic dimensions of any solution.

Sabbadino’s motto was “preserve nature with art.” In detail, his project for the development of Venice was based on the firm conviction that its natural wall should remain as it was, preserving the swampy buffer with a dynamic and blurred boundary which welcomed high and low tides, and which was favourable to the cleaning of the canals. (FIG. 4, 5)

“The walls of the city of Venice are the waters around the lagoon, including reeds, canals, and ditches.”

Sabbadino was convinced that building an embankment around the city, as proposed by Cornaro, would stop the use of the natural walls, ruining the function of the whole lagoon.

“A three-mile stretch from the lagoon would benefit not from
FIG. 4 Cristoforo Sabbadino, Venice lagoon’s map, 1558.
FIG. 5 Cristoforo Sabbadino, project for the enlargement of Venice, 1558.
ploughing or cultivating but from leaving meadows and woods and reeds and lowlands, where salty waters can deposit, and freshwater can pass through.⁵⁵⁶

In addition to this, the building of further embankments necessary for the reclamation and multiplication of freshwater canals would have incentivized the movement of agricultural land towards the lagoon, leading to further landfill processes.

Based on this essential assumption, Sabbadino subsequently defined new principles on which to base the expansion of the city. Firstly, he preserved the natural wall of Venice, and secondly, he hypothesised how to extend Venice from its existing core, figuratively following its morphological structure. New plots, which would have been created through the reclamation of marshland, could instead be obtained by using the mud removed from canals. Reusing this material for reinforcing riverbanks and shorelines, as well as for expanding islands, was already common practice. This procedure would provide plenty of benefits for the entire lagoon, much like a circular economic process. It would do more than create new dwelling spaces; by lowering the canal beds, it would improve the hydrodynamics of the lagoon, resulting in cleaner water, fresher air, and more navigable canals.

In contrast to Sabbadino’s suggestions, Cornaro proposed building up arzere (embankment), flanked by an inner water canal around the city. According to Cornaro, in those places where the landfill of the lagoon has occurred irrevocably, this would protect the water inside the lagoon by pre-
venting any materials from flowing into it from the river or sea.

Sabbadino responded negatively to this proposal, disagreeing with his opponent by way of two further arguments, which moved beyond his own conviction of the effectiveness of the salt marshes. Firstly, owing to the irregular shape of the lagoon, Cornaro’s project would be extremely difficult and expensive to construct. Its construction would have required a considerable amount of timber piling and stones, requiring “the forests of Germany and the mountains of Leipzig” and thus making Cornaro’s project financially unviable.57

In addition to this, even if Cornaro’s project were completed, Sabbadino suggested that the embankment would erode over time and become unstable as a result of water movement, sea tides, and river flows, ultimately becoming even more harmful. The construction of Cornaro’s embankment and new canal would upset the delicate balance of the intertidal zone, made up of velme and barene, reeds, sandbanks, and pre-existing canals. Additionally, its size would significantly reduced the lagoon’s water space, aggravating the landfill issue rather than solving it.

Against Sabbadino’s critiques, Cornaro understood his embankment project as fulfilling two clear purposes: to protect the lagoon, and to create a clear arable area shielded from the high sea tide and its salt water. According to Cornaro, the swampland would be split into two sections: the lower areas would be excavated to extend the lagoon and the upper swamp converted into agricultural fields and forests.
In Discorso delle provision de la Laguna, Cornaro explained, in detail, what he considered to be the most advantageous conditions for preserving the state of a city: clean air and a secure seat, or a city’s capacity to endure attack, maintain its defensive perimeter, and protect “its citizens’ way of life.”\textsuperscript{58} The landfill process negatively impacted both the quality of air and the security of Venice, over time completely transforming the appearance of the lagoon’s edges; once rich with gardens and villages, these areas became flooded and uninhabitable. Writing about the city’s inability to feed its own citizens was quite a novel issue. Even if Cornaro’s vision of the lagoon was misguided and probably driven by his own interests, his general contribution, despite this, remains historically prescient. It provides insight into the living conditions of the poorest social classes, enabling that population to have a voice. According to him, landfill was an inevitable process that could be reduced but not totally eliminated. On the contrary, land reclamation could guarantee a long-time supply of food and relative peace. Addressing the Doge of Venice, he exhorted the: “truly strong and beautiful city, where one breathes clean and abundant air, (...) But above all these useful things I see one more important than all of them, the fact of having your lordship’s food supplies and his powerful lands. He will witness others be at war, whereas he will be just a spectator, thus always maintaining his state of peace.”\textsuperscript{59} This speech was particularly notable since it was given at a public inquest of a technical nature. In contrast to Sabbadino’s arguments, Cornaro’s analysis illuminated social issues that
complicated the concept of the lagoon as a whole.

Cornaro’s observation was not unfounded. Plague, famine, and the end of the peace period undoubtedly worsened the republic’s financial and political situation. As a result of these events, the Venetian nobility was forced to distinguish its investments in Terraferma even further. Additionally, land acquisitions were further facilitated in the sale of expropriated land taken from landowners affiliated with France during the War of Cambrai. According to Ruggero Romano, patrician families also received extensive financial and political support from Venice to carry out reclamation activities.

Increasing demands prompted the Republic of Venice to establish Provedadori Sopra i Lochi Inculti del Dominio Nostro e Supra l’Acquadazion dei Terreni che ne Avessero Bisogno in 1556. The institution was created to promote agriculture with the primary objective of ensuring that the development of activities would not adversely affect the lagoon or the city of Venice, whilst also ensuring those who abused this aim were punished. Anyone wishing to reclaim land had to obtain permission from the Collegio dei Dieci Savi, assisted by Proti, such as Sabbadino, who would carefully consider any proposals. After these proposals were approved, however, landlords were bound to bear all reclaiming costs except for major works funded by the Republic. This financing mechanism resulted in the formation of the first private consortia, increasing the possibility to reclaim lands at greater scale and speed. Furthermore, the consortia acquired greater bargaining power than private individuals, undermining the relationship
between public and private interests that had previously guaranteed the lagoon’s physical equilibrium.

Venice had maintained a dominant position since its earliest conquests of the mainland by Tomaso Mocenigo in 1403. It asserted its political power, never allowing the nobility on Terraferma to participate in the administration of the Republic. Additionally, legal authority, constituted by reformed laws and regulatory institutions, was more focused on Venice’s health than the welfare of Terraferma, despite still promoting the innovative management of these lands. This only further divided the two regions and their respective inhabitants. Despite the overall political unity of the territory, the economic and social interests of Venice often overtook those of Terraferma and its inhabitants, imposing solutions and views that were always in favour of the city and the lagoon.

Cornaro’s first request to the Collegio dei Dieci Savi can be understood in this context: in 1514, he began his agricultural business, requesting permission to reclaim inherited land in Codevigo, an area on Terraferma characterised by swamps and barren soil. Several other suppliche (pleas) followed, some with positive outcomes, as illustrated by Cornaro’s letter to Sperone Speroni. Others were rejected by Sabbadino, who claimed the risks associated with modifying the canal system and reducing the area of saltmarsh were too high. (FIG. 6) However, Cornaro tirelessly engaged in the reclamation of lands for over 50 years, dedicating his entire life to this project.
Even though Venice suffered a crushing defeat at the Battle of Agnadello that revealed some of its weaknesses, afterwards, the courageous defence of Padua in 1510 resulted in a new alliance being formed between the Venetian aristocracy and peasants on *Terraferma*, suggesting an end to feudalism (de-feudalization). However, a long period of re-feudalization soon followed, without any significant improvement being made to the conditions of the peasants living in Padua. As Fiocco has suggested, Cornaro can be seen to truly care about *Terraferma* and its countryside. He spoke on behalf of multiple groups, including small and large landowners, settlers, and peasants. His concern is reflected in a letter written to the Doge in 1565 to promote his reclamation plan. Here, he stated that reclaiming the swampy areas around Verona, which ran along the river Po, Padua, and Treviso, would help maintain the hydraulic balance of the lagoon. It would have freed Venice, and, once again, he supported his argument by mentioning the famine which strongly affected farmers and small landowners:

“If they want to live, they have to eat the fodder that animals eat. [This poor condition] has already forced many residents to leave the provinces and move to another country, leaving behind their homes, and belongings, taking their children, and suffering harm and inconvenience.”

However, according to Cornaro’s point of view, the countryside was not just a place of suffering. It provided, on the contrary, a sense of renewal for the individual spirit, as well as for society. In his book *Discorsi della vita sobria*,
FIG. 6 Giovanni Trevisan, Nicolò e Giacomo Alberti, Retratto di Alvise Cornaro e soci a Fogolana. 1542.
and even more so in *lettera che scrissi sopra li retratti delle paludi che circondavano questi monti*, Cornaro portrays the rebirth of this land as an Arcadian space, where economic prosperity and political peace merge with beauty.\(^70\) His words are accompanied by a sense of joy, pleasure, and solace. He describes how the Euganean hills are able to see their “miraculous liberation,” participating in laughter and song:

“The meadows smile, covered with vivid and diverse flowers and filled with odours. The woods smile, covered in a new and very cheerful green. The trees smile, full of fruits of so many, diverse and delicate species. The vineyards smile and make the most beautiful fragrance in their bloom. The fountains of water smile clearer than ever, as they are of greater quantity while descending with a greater murmur. The many little birds of different species sing raised by the clear and new air. But above all the ‘infinite flock of the nightingales still sing the night accompanied by the pleasant song of the crickets, the fathers of sleep. The shepherds sing, laugh, jump, dance, and play, seeing their beasts passing by and so well fed by the grass, which produces sweet and fatty goods that the animals, in order to be well nourished, need no other bread during so many famines. All these songs, so much laughter, and sounds, all proceed well from the great cheerfulness of the mountains and their liberation, as I said: which has returned them to their original beauty, as they used to be when the divine Petrarch decided to dwell and die there.”\(^71\)

The personification of nature is also present in this case. The vitality of mountains is portrayed through the blossoming of flowers and meadows, as well as through the songs of animals. Although Petrarch’s final line refers to the Arcadian genre, comparing it to Virgil’s and Alberti’s works, Cornaro appears to adopt a superficial and aestheticized view of their contributions. He does not grasp the dimension of justice
and balanced coexistence, underpinning their contributions and the symbolic meaning of the landscape depicted.

On the one hand, it is unclear how much Cornaro’s commitment to rural life reflects a genuine concern for peasants and whether he was aware of the poor living conditions and poverty in which most of them in Terraferma lived, often mentioned in other texts for other purposes, but not included in this writing. However, it is undeniable that this writing represents an attempt to portray rural life, metaphorically or not, as a place where the collective dimension is still evident and human beings’ inner spaces are still connected to the environment. A breakthrough would be needed to resolve his ambiguity. This occurred with the plays of Angelo Beolco (Ruzante), with whom Cornaro had been intimately familiar with since he first hosted him at his residence in 1525. Ruzante’s contribution added new perspectives to this idyllic picture, providing an effective insight into the voiceless peasants’ life at that time.

4.4 Angelo Beolco, Ruzante: a new Arcadia rusticana.

Angelo Beolco, better known as Ruzante, was a Paduan playwright who wrote numerous plays. In his contributions, peasants came to definitively take the place of Virgil’s shepherds, thus repopulating Arcadia. Ruzante’s purpose was to convey to the audience a tragic sense of the living condi-
tions, duties, and hardships faced in the Paduan countryside. In these terms, Ruzante took on the role of an “activist writer” in the same way that Virgil did. This is already evident in his first work La Pastoral written in 1521.

Unlike the preface, which is also written in the Florentine dialect, La Pastoral consists of twenty-one scenes divided into two parts, written entirely in Paduan dialect. The plot is very simple. The first part of the play recounts an unrequited love story between Melesio, an old shepherd, and Siringa, a nymph who rejects him, causing his death. This tragic event calls on stage two other shepherds: Mopso intervenes to aid the old dead shepherd but faints on the ground upon seeing him. Arpino, another shepherd, who believes both are dead, calls Ruzante, a peasant, to ask for assistance in burying the bodies at Pan’s altar. It is at this point that the countryside of Padua takes on a central role in the narrative, through the entry of new characters on stage, such as Zilio, another peasant, and Master Francesco, the physician. Both characters serve the function of helping Ruzante and Arpino recover Mopso’s body. It is Master Francesco, however, who plays an instrumental role in attempting to help Ruzante’s father, bringing the play to an end. Although the doctor administers a remedy, Ruzante’s father dies, leaving behind his house and livestock to his son. Ironically, it seems Ruzante was waiting for nothing else; the play concludes with him enjoying his inheritance and newfound freedom from his father with surprising relief.

However, looking at this structure, the play appears
more complex as a result of an encounter between two genres, satirical comedy and the Arcadian. The reason for this hybridity is still debated among scholars. On the one hand, theatre was well consolidated and deeply rooted both within the Venetian tradition and in the spatial organization of the city. This form was likely a natural choice for Ruzante. Additionally, the type of tragicomedy that Ruzante aspired to, was deeply rooted in Greek satyr plays, which also demonstrated an affinity with the pastoral, and so pointed to a possible common origin between the genres. In the Greek tradition, satyric drama combined tragic and comic elements, including Demi-gods’ characters, known as satyrs, who were half man and half animal. Chief among the satyrs was the god, Pan, who represented the essence of fertility and life in nature.76

However, the debates surrounding Ruzante’s reference to the Arcadian genre in the first part of La Pastoral seem unresolvable. Some scholars claim that La Pastoral was written as a counterproposal to another pastoral work of high popularity at that time, Jacopo Sannazzaro’s Arcadia, whilst others suggest that Ruzante’s hybrid approach to genre was simply the result of his youthful uncertainty.77

In such debates, the hypothesis formulated by Mario Baratto seems most comprehensive; Ruzante should be understood, not in opposition to the Arcadian genre as a whole, but rather to its specific academic, artificial, and aesthetic uses. He adapts aspects of the Arcadian discourse into his vision of the Paduan countryside, locating and emphasising concrete human experiences by critically re-presenting the ideality of
Arcadia in his own time. In this sense, whilst working in the form of theatre, Ruzante can also be interpreted as adhering faithfully to Virgil’s poetic work and its original intent. Strategically, satirical comedy served as the perfect tool for portraying peasants and their surroundings as a “world without history,” which needed to be conveyed to Venetian citizens who welcomed this genre.  

According to Baratto, Ruzante assumes the responsibility of a narrator, by revealing their inner “naturale” dimension. Baratto explains, “Ruzante believes in the profound vitality of peasant people, which manifests in their hunger, their daily work, their fertility, and their dances,” as well as their laughter as it resounds through the beauty of a paradisical landscape. Ruzante does not trivialize this world. Like Virgil, it is through the naturalness of peasant life that he perceives beauty. He sees the inner vitality of peasants as an essential component of human happiness, providing his answer to Theogenius’s question: “what makes a human being the happiest?”

However, peasant life was constantly overshadowed by social injustice and oppression, imposed on them by the unnatural laws and customs of the city. The contrast between this civic setting and the countryside is not a spatial issue; it should be viewed in terms of contrasting power and discourses, privileging the noble citizens of Venice at the expense of the peasants on Terraferma. The peasantry and the lands they inhabited were exploited and reduced to poverty by incessant wars and famine. It is in this context that Ruzante aims to
formulate “a new Arcadia Rusticana.”

This new Arcadia can be glimpsed in the scene of *La Pastorale* that presents the encounter between Arpino, the shepherd, and Ruzante, the peasant. In an exchange of jokes between them, Ruzante encloses a sense of the overall meaning of his work. As he attempts to convince Ruzante to help him, Arpino exclaims, “Oh sacred Pan, have mercy on your servants.” Hearing the word ‘Pan’ and mistaking it for *pane* (bread), Ruzante answers, “Do you want to give me some bread? Let’s go soon.” This misunderstanding between *pane* and Pan, the Demi-god of Arcadia, immediately gestures to a theme of special significance for Ruzante: constant hunger and the struggle for survival. Through the joke, Ruzante expresses a vital sense of the naturalness shared between the shepherd and peasant.

The topic of hunger and, specifically, the scarcity of bread, is discussed by Zilio later in the fifteenth scene, in dialogue with Ruzante. Additionally, this is the first scene where fragments of the Paduan landscape appear: the walnut tree, the mill, and the ditch, which follow on from the ploughed fields represented in the fourteenth scene. In other scenes, Ruzante displays animals which populate the countryside, such as the Lorina cow, towards which he expresses affection. It is undeniable that these figures offer different kinds of companionship in contrast to the animals depicted in the classical Arcadian genre. Birds, for example, are hunted. Livestock is considered a subsidiary part of agricultural activities. Though in total, everyone, human and nonhuman, plays a collabora-
tive role in the natural order, participating in the rules, temporalities, and language of the countryside without contradiction.

Moreover, Ruzante’s choice to write in the Paduan dialect is an additional component of his purpose; it was his further means of claiming the dignity of the peasants in terms of their natural spirit, understood as the vital foundation for all human relationships. As Baratto points out in his commentary on the first *Oratione*, the praise of peasant naturalness was the only way that Ruzante could overcome the separation between the countryside and the city, between the oppressed and the oppressors.85

4.5 Paulini’s Codex: the mountain’s perspective.

The debate between Cristoforo Sabbadino and Alvise Cornaro, as well as the inequalities described by Ruzante between inhabitants of the city and countryside, does not have to suggest that the complexity of Venice’s ecological system ended with the tension between these components. Already upon reading Marco Cornaro’s investigation into the mountainside forests surrounding Venice, an awareness of how management policies affected the whole territory, and the health of the Republic, appear present. However, these mountainous landscapes and their inhabitants were not afforded the total attention they deserved.86
In response to this sense, Paulini’s codex represents a valid testimony.\textsuperscript{87} It was written in the form of \textit{supplica} by Iseppo Paulini and submitted to the Republic of Venice concerning its lands in Val Serpentina, around Belluno, 110 kilometres north of Venice. The codex also provides an opportunity to closely examine the history of other communities that composed the Republic.

At the turn of the 17th century, Paulini was submitting his requests, as Venice was experiencing an economic upturn. The Republic had overcome the financial burdens and intense political stability of the previous century, so significantly that it is remembered as the century of Italian wars.\textsuperscript{88} Even population numbers, which drastically dropped due to severe plague that swept throughout the country in 1575 and 1576, had started to rebalance. However, between 1580 and 1630, the flow of capital and investments substantially increased, incorporating the mountainous regions into Venice’s economic system. In addition to the sale of ecclesiastical land, this marked a first step in the process of selling the Republic’s land in order to increase tax revenue for the Venetian government throughout the seventeenth century. Prior to this, a large portion of public land was entrusted to local authorities, who were guided in deciding how it should be utilised: for grazing, forestry, or agriculture. From the sale of lands, the division between local political institutions and central government became even more apparent, resulting in harm to local communities and rural populations. The Republic persevered in regulating its territory through new institutions, such as the
Provedditori sopra i beni comunalì (1574) - an institution set up to survey and examine the rights of landowners, as well as safeguarding the common lands of the Republic, there is no doubt that these changes affected the expansion of agricultural land and forest exploitation, as well as cattle breeding. Additionally, the regulations were intended to protect the Republic and its landowners, often conflicting with other communities and social classes, making the management of the territory even more difficult and multiplying the tensions already mentioned in Terraferma.

Although this document is partial since it contains Paulini’s perspective and pertains to his financial interests, the attached drawings and their meaningful captions illustrate vividly his concern regarding the ongoing exploitation of the mountain landscapes. Paulini’s visual apparatus varies with regards to style; some drawings are very accurate and well-illustrated while others present more practical and rough visual descriptions of his ideas, mapped across different scales. However, a recurrent theme is carried through these illustrations that emphasise a temporal comparison between the valley’s appearance according to Paulini’s memories, and the way it appears in the present at the time of his writing; a landscape once “green and dotted with trees until 1500” was now ravaged by deforestation. (FIG. 7)

Reading the observations in his supplica, it is evident that Paulini was conscious that the land, forests, water systems, and animals of the mountainside had an impact on each other, and their transformation had a further destructive im-
pact on the lagoon and landfill processes. In fact, despite numerous hydraulic interventions in the rivers, landfilling continued to negatively affect the lagoon, consequently becoming an even larger concern for the *Collegio dei Savi*. Almost mirroring Sabbadino’s arguments, Paulini began his request with these words: “The strength and marvelous beauty of this city come mainly from its location, and from being born from the waters, surrounded by swamps, which make it miraculous to those who contemplate it, and invincible against any potentate (...) But it is clear that because of its salt marshes it’s going to be buried every day.”

Paulini attached a map of Venice’s territory to show dangerous phenomena and the damage posed by rivers as a first drawing of his *supplica*. We can readily understand the map’s nature and purpose, thanks to the detailed annotations in the margins which provide us with valuable insight into the lagoon’s state of health during that period: the yellow colouring indicates the rivers that are least dangerous. Although originating in the mountains, they remain clean since they pass through wooded areas. On the contrary, the colour red indicates dangerous rivers, such as the Piave, Tagliamento, and Po. (FIG. 8)

In reiterating once again the risk of landfill of the lagoon, Paulini hoped to gain permission for the construction of a canal that he believed would benefit the city. Following this letter, a few approvals were obtained with requests for a few further drawings related to the project. Ultimately, it remains unknown whether Paulini came to build his canal or
not. We can, however, turn to a second letter that Paulini sent to the *Collegio dei Savi* six years later, accompanied by a new set of drawings. In this second request, Paulini asserted that the actions taken so far by the Republic against the landfill process had not succeeded. According to his perspective, the lagoon’s damage was caused by the destruction and clearing of mountainside environments, and through converting these parts of land into agricultural fields and pastures.

He asserted that, for more than a century, many forests were destroyed by burning so that agricultural land could be cleared. He focussed on this previously unaddressed issue:

> “Therefore, I go thinking, that the fires, which for a hundred years now occur every year in the mountains of Serenissima, are one of the first and main causes of these evils. In fact, some burn the bushes, where the forest has been cut down, in order to create fields and pastures. Others set fire to the bushes and dry grasses in order to widen the pastures and to have the new herbage quickly and more morbidly, so that each year almost all the mountains are several times destroyed by this fire, which, transported by the wind from everywhere, widens and passes into the woods where it consumes and burns all the new plants that nature has produced; it burns the old trees by sticking the fire to pines, larches and other flammable trees, and penetrates as far as the valleys and the highest crags, which are inaccessible; it consumes and reduces to ashes those woods, which cannot be cut or removed. Those who consider the quality of the mud that lies every day on the banks of this city will realize that all that matter is wet ashes, mixed with other matter.”

As well as destroying the woodland, ash and other waste products of the fire would contaminate the rivers and carry materials downstream. As a consequence, large volumes of water containing waste materials entered the lagoon,
FIG. 7 Iseppo Paulini, drawing of Val Serpentina, 1608.
FIG. 8 Iseppo Paulini, map of the Venetian territory with the highlighted rivers responsible for the landfill process. 1608.
repeatedly breaching the embankments of rivers and flooding the surrounding areas. Paulini describes how this process: “ruins the countryside, destroys buildings, houses, and sometimes entire villas, as in our times we have seen often, and with impetuosity descending they carry all the fatty matter and more into the slight sea, which then fortunately with its flow and reflux deposes everything in this lagoon, making the damages of landfill visible.” \(^\text{92}\)

From Paulini’s point of view, converting forests to agricultural fields was not the principal problem; rather, the real damage came from the lighting of fires to produce them. His explanation includes a series of illustrations, used uniquely as tools for persuasion. They do not aim to be artistic or accurate, but rather effective in conveying the damage caused by fire. Two drawings represent a detail of a majestic tree. One tree appears lush and healthy, being able to slow the fall of rain and snow, releasing water slowly into rivers and canals. The same tree, burned by the fire, is represented as barren and unable to participate in this process. (FIG. 9a and 9b)

In the case of fires, damage extends to more than trees; the absence of small trees under the ash in Paulini’s second illustration is representative of the soil’s inability to regenerate new trees. This visual detail points to damage that is not merely temporary but, like the cutting of trees, corresponds with long-term devastation.

The same content and visual approach is adopted within six drawings that portray the entire mountainside; in an almost cinematic sequence, Paulini attempts to represent
the development of the landscape in relation to the damages caused by human interventions. As previously mentioned, when the mountain is densely forested (FIG. 10a), it protects the ground beneath and prevents rain from eroding the soil. Even if the forest is partially cut at the bottom of the valley (FIG. 10b), it can still serve the same protective purpose. Paulini appears a little unconcerned about the extent of potential damages whilst the forest is at least preserved on the upper portion of the mountainside (FIG. 10c). However, when the mountain is burned and its forests destroyed, it becomes almost impossible to reforest the land. This leads to raging floods and the deposition of large amounts of debris in the lagoon and surrounding countryside. (FIG. 10 d, e, f)

Along with these rudimentary graphics, Paulini includes another series of well-illustrated views of an anonymous valley. On the one hand, it is depicted as a valley with lush vegetation in good condition, and on the other hand, as one ravaged by fires. (FIG. 14 a, b) Even though the content is identical to the previous drawings, Paulini’s application of a different pictorial technique is surprising, echoing Flemish landscape paintings of the time. The appearance of this in Paulini’s images, apparently created without artistic aim, is further cause for consideration. It is very likely that Paulini instrumentalised this pictorial approach to persuade the Savi. It is interesting to note, however, that the approach often viewed by art critics as the first clear visual expression of the objectification of nature, is used here to illustrate the destructive interventions of human beings.
FIG. 9a Iseppo Paulini, drawing of a healthy and luxuriant forest, 1608.
FIG. 9b Iseppo Paulini, drawing of a forest damaged by fires, 1608.
FIG. 10 Iseppo Paulini, drawings of the details of a forest damaged by fires, 1608.

10a Healthy and luxuriant mountain landscape.
10b Healthy, luxuriant mountain, but with trees being cut down at low altitudes to make way for agricultural fields.
10c Mountain with trees only on the upper level.
10d Mountain with forest damaged by fires.
310
10e Exploited landscape, wit few trees.
Exploited landscape, without treegrowth.
After outlining the causes of forest exploitation and their connection to the landfilling process, Paulini continues by explaining how excessive amounts of manure, produced by increasing cattle colonies, contribute to the debris washed away from these mountains. For this reason, he calls for a ban on putting in _strami_ to collect manure, suggesting a replacement to this practice by digging ditches along fields to collect water.\(^94\) In these observations, it is understandable how Paulini’s intentions were certainly ambivalent. Probably he was not just seeking to convince the _Collegio dei Savi_ that woodlands had been damaged, but also to discredit the rudimentary practices, such as _debbio_, which were commonly used by mountain communities and peasantry, in order to extend his landholdings.\(^95\)

However, Paulini includes some drawings of a stretch of river, which illustrate a few simple interventions for preserving the riverbanks, such as clearing and reforesting them with willow trees, which represent a testimony of what I defined as informal technological cultures. (FIG.11 and 12)

In addition to stabilising the soil along the riverbanks, this practice helped to instil a virtuous cycle that preserved the mountain landscape as an ecological system. Paulini recommends “forbidding the peasants to cut its banks,” and to instead:

“Leave the wood intact for some time, and then cut the thickest willows every five years. Leave always the thinnest and youngest trees since they can bend and flex. This procedure provides stability and restraint against the muddy current of floods. However, these trees should not be allowed to grow for more than eight or
ten years without being cut. This is because they will become so thick that at the mercy of oncoming floods, they would be quickly uprooted bringing greater ruin than before.⁹⁶

While Alberti had already described these practices, providing them with a sort of theoretical dignity within his treatise, here Paulini uses informative drawings to illustrate their technical application more precisely. This situates a historical testimony regarding the use and knowledge of such technological practices.⁹⁷ Reading between Alberti’s and Paulini’s contributions, one can begin to detect a common thread that binds these informal practices throughout history. They encompass cultural heritage and social organisation, though these are often considered secondary to impacting transformative interventions, such as the geometric diversion of rivers and their damming with rigid artificial walls. On the contrary, their contributions suggest an aesthetic capable of mediating a virtuous interaction between nature and human interventions. It is not by chance that their suggestions often pertain to soft engineering practices, which are considered the most environmentally sustainable.

Another drawing represents the same stretch of river; here, Paulini proposes dividing the property along the stretch so that each landowner would be responsible for taking care of a part of the riverbank. Beyond protecting sites of mass production, this would have strengthened the sense of a shared community committed to maintaining the landscape’s health. (FIG.13)
FIG. 11 Iseppo Paulini, drawing of the proposal to clear the riverbanks, 1608.
FIG. 12 Iseppo Paulini, drawing of the proposal to reforest the riverbanks, 1608.
FIG. 13 Iseppo Paulini, drawing of the proposal for the boundaries of riverbank properties, 1608.
FIG. 14a Iseppo Paulini, drawing of a valley with lush vegetation in good condition, 1608.
FIG. 14b Iseppo Paulini, drawing of a valley ravaged by fires, 1608.
Endnotes

1 In his description of the transformation of the Republic of Venice between the 15th and 17th centuries, Ennio Concina wrote the following eloquent consideration: “Venice got a new consciousness and a new knowledge of itself (…), of the nature of its body.”


2 This expression is the direct translation in English of Mafredo Tafuri’s book written with Antonio Foscari, *L’Armonia e i conflitti. La chiesa di San Francesco della Vigna nella Venezia del ’500* (Turin: Einaudi, 1997). In this book, Tafuri’s investigation dealt with just architectural transformation within Venice, without considering the entire territory. *Terraferma’s* political and social tensions and the transformation of its landscape were remarkably similar to the events that took place in the city. In this sense, the title of Tafuri’s text could also be extended to describe these events.

3 See chapter 3.


6 These parishes were islands eliminated by canals and connected to the rest of the city via mobile bridges or by boat.


7 Ibid., 53.


9 Dennis Romano, *Patricians and Popolani*, 57.

10 (Translated by the author) Nelli E. Vanzan Marchini, *Venezia civiltà anfibia* (Verona: Cierre edizioni, 2009), 123.

11 In this sense, Romano has provided examples of disputes between citizens in which the public good of the city prevailed over the private interests

12 Romano attributes this change to the successful outcome of Chioggia’s war against Genoa in 1432. This greatly benefited Venice’s economic and political stability. Society did, however, move from a community-based system into a hierarchical one. The conquest of Padua, Verona, and Vicenza marked the beginning of a new political scale for Venice’s territory, which sharpened this social change. Therefore, the community’s internal structure, its institutions, and its relationships with mainland populations had to be reorganized to accommodate new interests and concerns. Ibid., 32.

13 Dominant, an appellation used in Venice.

14 Marco Cornaro was born in 1412 in Venice, where he then died in 1465.

15 His contribution remains bound to two texts: the first as the result of a site inspection of the Serenissima woods in the northern territory of Venice along the Sile and Tagliamento rivers, *Sopra i Boschi* (1442), and the second, where he discusses the strategy to save the lagoon from landfill, *Della Laguna* (1450).

Published respectively in Italian in Marco Cornaro, “Scritture sopra la laguna. Scrittura 1, 2, Sopra i boschi: Dello stato della città di Venezia per la negligenza e disobbedienza dei suoi cittadini,” 39-75.

Cornaro, “Scritture sopra la laguna. Scrittura 2, Della Laguna: Dello stato della città di Venezia per la negligenza e disobbedienza dei suoi cittadini,” 75-159.

http://asa.archiviostudiadriatici.it/islandora/object/libria%3A47742#page/214/mode/2up

16 (Translated by the author). Ibid., 151.

http://asa.archiviostudiadriatici.it/islandora/object/libria%3A47742#page/214/mode/2up

17 (Translated by the author). Ibid., 151.


19 It included, for example, the management of forests and cleaning the countryside, canals, riverbanks, and cities.

20 According to Ivone Cacciavillani, the laws regarding the territory at the time can be divided into three groups: those concerning the water regime, those related to reclamation activity, and those of forest maintenance. The latter mainly concerned the protection of the forests for economic and defensive purposes, such as the construction of buildings’ foundations and ships. Specific laws weren’t contemplated in order to maintain them and maintain the hydraulic balance and defense of the territory, which was already compromised as Marco Cornaro had observed. On the contrary, laws regarding water management multiplied and diversified depending on three
different historical periods: those issued from the origin of the city up to the 15th century, which mainly concerned Venice, its surrounding area, and those rivers that directly flowed into the lagoon; those issued from the 15th century to the 17th century, concerning the rivers and related issues of the wider territory; and those corresponding to the last century of the Serenissima.

However, we can find the laws related to reclamation from as early as 1556, which was the year that marked the birth of a new institution, *Provedditori sopra i loci inculti del Dominio nostro et supra l’adeguazione dei terreni che ne avessero bisogno*, established to define rules on reclaiming the swampland. This fact reveals undoubtedly that the reclamation activities around Venice were becoming increasingly widespread and uncontrolled, therefore deserving greater political and organizational interest.


22 Among the authors already investigated, Pliny and Lucretius showed this aspect.

23 (Translated by the author).


24 See endnote 65, introduction.

25 See chapter 1 endnote 83 on Plato and the concept of *anima mundi*.


In this paragraph, Descola briefly describes analogism in addition to animism, totemism, and naturalism: “The distribution of the four combinations of similarities and differences is organized on the basis of two vertical axes. One is characterized by wide dichotomous separations, the preeminence of continuity over discontinuity and the inversion of the poles of hierarchical inclusion. In animism, the continuity of interiorities between humans and nonhumans who share the same “culture” takes on a universal value (in contrast to the particular and the relative introduced by the differences in the forms and in the biological equipment). Meanwhile, in naturalism it is the continuity of physicalities within the unified field of nature.
that plays this role (in contrast to the particular and the relative introduced by cultural differences). The other axis favors chromatic continuities and, in a paired symmetry, juxtaposes a system of resemblances tending towards identity (totemism) and a system of gradual differences tending towards continuity (analogism).”


29 “Cartography and planning have enjoyed a long and mutually influential relationship since the fifteenth century. Throughout the twentieth century, mapping in design and planning has been undertaken conventionally as a quantitative and analytical survey of existing conditions made prior to the making of a new project.”

30 The Moon diagram.
32 See endnote 72, chapter 2.
33 (Translated by the author). Sabbadino, “Discorsi de il Sabbadino”, 40.
34 (Translated by the author). Ibid., 41.
35 (Translated by the author). Ibid., 43.
36 (Translated by the author). Ibid., 109.
37 Sabbadino refers to Aleardi, who was an expert from Milan, whom he called to provide his opinion of the Brenta’s river. After a few years, his project was revealed to be ruinous.
38 (Translated by the author) Cristoforo Sabbadino, “Discorsi de il Sabbadino,” 47.
39 Ibid., 48.
40 Many forests were located in the territories surrounding Venice, up to the mountain regions, as well as Istria.
41 (Translated by the author). Sabbadino, “Discorsi de il Sabbadino,” 49.
42 Their locations and constructions were regulated in detail, whilst any abuse, tampering, or illegal construction was punished by law. Illegal pilings and fishermen’s nets (grisiole) along rivers could have prevented the water flow or landfill.
43 Cava means artfully dug canal in Venetian. It comes from “cavar la tera” (digging the soil)
44 “Thinking therefore of the government facilitating traffic to the Continent by Mestre route.” (Translated by the author)
Due to the nature of the lagoon - an inconsistent soil made up of silt, clay, and sand perpetually in contact with salt water - a sophisticated system of foundations was coded from the 15th century onwards. During this period, the need to build even ordinary buildings, previously built in timber, in stone and brick had become common practice. A dense series of one-meter alder timber poles were anchored in direct contact with the muddy soil, on which a horizontal surface (zatteron) was built from larch or elm, and upon which the first level of brick boundary walls and Istrian stones defined the building outline, partially underwater. This level was internally consolidated by an impermeable clay core (tera da savon). For this reason, timber is selected as the most suitable material. Recent research has further demonstrated that, although the deepest level of this system is completely made up of timber, the water and mud that fill its voids between the poles maintain a very high resistance over time.

46 *Palina* is a single timber pole used to moor temporary or permanent boats. *Bricola* is a structure made up of two timber poles used to indicate waterways. *Dame* are made up of five timber poles with a light on the top, also used to indicate waterways. The functions of these elements have been regulated since the 15th century.

This area is located on the west coast, between Venice and Trieste.

Coal was needed to power the blast furnaces. This was produced by a technique called pojàt (or, ajàl) in which the wood trunks were opened in wedges, and arranged in the shape of a hut. The wood was then covered with an abundant layer of clay-like soil and then the pile was set alight, thus buried. The fire burned for several hours before being smothered. The earth was removed and the coal was collected.

These mines are located north of Venice in the Dolomites.

Montello forest is in a hilly area north of Venice towards Treviso. Cansiglio forest is located in the Pre-Alps, close to Belluno. See chapter 5.

He was born in Venice in 1484 and died in Padua, in approximately 1566.

Due to his interests, he became a friend of Pietro Bembo, a cardinal, as well as an influential writer, grammarian, and poet, and of Sperone Speroni, a writer and philosopher.

These works were written between 1540 and 1565.


(Translated by the author). Ibid., 127.

(Translated by the author). Sabbadino, “Discorsi de il Sabbadino,” 123.

Alvise Cornaro, *Alvise Cornaro: il suo tempo e le sue opere*, ed. Giusep-
The end of the peace period, starting with the Peace of Lodi (1508), was marked by the war waged against Venice by the Cambrai League. It was a bloody conflict that put Venice at risk of losing its entire territory and city for the first time in its history. Agnadello (1509) was the first battle in which the Republic of Venice was defeated, followed by the naval defeat at Polesella (1510). On this occasion, the League’s army reached the west coast of the lagoon, causing Vicenza, Padua, and other important cities to come under siege. However, thanks to the resistance of Padua and to changes in alliances, including the Papal State, Venice was able to retake the cities previously lost and safeguard its sovereignty. In spite of this, the conflict went on, only ending in 1530.

Most of the expropriations and sales began in the middle of the 15th century with Terraferma’s conquest. The estimate was that one third of these lands were already owned by the Venetian patricians at that time.

Cornaro began his reclamation of the land inherited by his uncle Angeleri Cornaro in a small village between Padua and Chioggia.

According to Cornaro, he had succeeded in cultivating millet and sorghum due to its tendency to flood often; however, only a few were able to grow wheat.

He was an Italian dramatist and philosopher.

As a result of his reclamations of Fogolana, Alvise Cornaro was accused of getting too close to the lagoon, in violation of the law.


Cornaro wrote this treatise, offering advice on how to maintain good health through a proper diet, adequate sleep, and living in the countryside away from the city (Venice). This aversion to the city was a result of the fact that he regarded it as a place of political intrigue, as well as of his own professional failure.

Cornaro, Alvise Cornaro: il suo tempo e le sue opere, 139.

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Cornaro, “Lettera che scrissi sopra li retratti delle paludi che circondavano questi monti,” in Alvise Cornaro, il suo tempo e le sue opere, 203-204.

“Ruzante’s theater has its roots in fat and heavy land, lazy waters, and airs so often harsh and dense.”(Translated by the author). Emilio Mene-
73 See endnotes 62, chapter 1.
74 Florence dialect was establishing itself as the dominant dialect for defining what was to become the Italian language.
75 This feeling is the result of biographical detail. Ruzante was an illegitimate child. The likely rancorous relationship with his absent father is mirrored in the work.
76 An example of this relationship can be found in Serlio’s depiction of a satyr scene in his treatise. In contrast to his comical and tragic scenes, this scene takes place in the woods or countryside, evoking the Arcadian landscape and the terms Theocritus uses to describe his characters.
“(…) or the great number of trees and fruits, with sundry herbs and flowers, all made of fine Silke of diverse colours. The water courses being adorned with frogs, snails, tortoises, toads, adders, snakes, and other beasts: Rootes of Corrale, Mother of Pearle, and other shells laid and thrust through between the stones, with so many several and faire things, that if I should declare them all, I should not have time enough. I speak not of Satires, Nymphs, Mermaids, divers, monsters, and other strange beasts, made so cunningly, that they seemed as if they went and stirred, according to their manner. And if I were not desirous to be brief, I would speak of the costly apparel of some shepherds made of cloth of gold, and of Silke, cunningly mingled with embroidery: I would also speak of some Fishermen, which were no less richly appareled than the others, having Nets and Angling-rods, all gilt: I should speak of some maids and Nymphs carelessly appareled without pride, but I leave all these things to the discretion and consideration of the judicious workmen; which shall make all such things as their patrons serve them, which they must work after their own devices, and never take care what it shall cost.”
77 La Pastoral was written in 1521, some years before Arcadia was written by Sannazaro, in 1504. Despite being part of this bucolic tradition, Sannazaro’s Arcadia partly takes place in Greece. The main character, Sincero (whose name means “honest”) takes shelter there, after escaping from Naples and afflicted by amorous pains. This female character is an allegory. The true lover is Naples, and Sincero’s pains are a metaphor for what Sannazaro himself was experiencing in that period: a dangerous political transition towards an unavoidable urban decline.
79 Ruzante uses the dialect word “snaturale,” which means natural. This is explicitly used in the prologue of La Moscheta.
80 (Translated by the author). Baratto, Tre studi sul teatro. Ruzante, Aretino, Goldoni, 35.
81 In the first Oration, Ruzante describes the Paduan countryside as a paradise. This work was written around the same time as La Pastorale, in 1521, for Marco Cornaro on the occasion of his installation as Bishop of Padua. He imagines giving a speech on behalf of his fellow villagers, whose dignity he claims. He includes a description of their language, the goodness and variety of what they ate - bread, wine, legumes – and the places they inhabit, as well as the plants and animals that inhabited these places, as in the beauty of women, too; a paradise.
82 See chapter 2.
83 Baratto, Tre studi sul teatro. Ruzante, Aretino, Goldoni, 34.
85 As noticed by Nancy Dersofi, in late works, such as La Piovana and La vaccarìa, Ruzante seems less sure of this, becoming more cynical. Characters and their landscape begin to change, expressed through an irrecoverable separation from the city.
Nancy Dersofi, Arcadia and the stage (Madrid: José Porrúa Turanzas, 1978), 121.
86 See endnote 8.
87 Similarly to Alvise Cornaro, Iseppo Paulini and Hieronimo owned some lands around Belluno, but not much is known about them except for the information contained within the codex. In 1602, Iseppo Paulini and Hieronimo, his brother, wrote to the Serenissima for the first time, offering to pay for the construction of a water fitting which would have positively affected the still-on-going landfill process, in exchange for land ownership. The complete codex consists of subsequent resolutions from 1602 to 1608, when Paulini made a further request. Drawings are likely to have been part of the iconographic apparatus of this second request. In this sense, the codex had a personal aim.
88 Flexibility in the alliances between the Italian countries and the French, as well as the Sacro Romano-Germanic Empire and its expansionist objectives on the Italian Peninsula, contributed to the extension of conflict for sixty years without peace. The ratification of peace in 1530 marked a political victory for the papacy over Venice and Charles V, who at that time
was Emperor of the Sacro Romano-Germanic Empire, Archduke of Austria since 1519, King of Spain since 1516, and Prince of the Netherlands as Duke of Burgundy since 1506. As a result of the peace accord, Venetian authorities were forced to return the Romagna region to the Papal State. Other conflicts followed, between 1536-1538, between 1542-1546, and between 1551-1559, which did not involve Venice. The Peace of Cateau-Cambrésis of 1559 ended more than sixty years of uninterrupted warfare for control of Italy.

In addition to this instability, the risk of further conflict with the Ottoman Empire, which was a source of destabilization of Mediterranean commercial routes, remained an unchanged concern for the Republic. Despite this, many maritime routes were reestablished.

89 “Paulini took a further step towards a conception of landscape in which physical, geographical, social and economic elements are integrated to form a complex and interrelated system. No doubt by virtue of its provenance, he reversed the usual perspective and took into consideration the habitat of the Lagoon starting from its Alpine origins, and not vice versa, as was the case in traditional lagoon-centred literature.” (Translated by the author)


91 (Translated by the author). Ibid., 112.

92 (Translated by the author). Ibid., 111.

93 To understand the differences between Flemish and Venetian landscape paintings, please refer to chapter 5. To understand the differences between Flemish and Venetian landscape paintings, please refer to chapter 5.

94 Dry herbs and straw that serve as fodder for cattle.

95 It is a rudimentary practice of fertilizing the soil through the burning of cultural residues or vegetation.

96 (Translated by the author). Paulini, Codice Paulini, 118.

97 See chapter 2.
5. Hydraulic Treatises, methods of water management, machines and maps.
5.1 From the Closed World to the Infinite Universe.

Alexandre Koyré defined the 17th century as a transitional historical age – *From the Closed World to the Infinite Universe* – in which scientific disciplines became more and more defined in their epistemological structure.¹ Since the 17th century, the birth of modern scientific disciplines prompted an increasing dismissal of the humanistic approach to knowledge which was previously prevalent. Philosophical, ethical, and artistic thought was shunned in favour of disciplinary specialization which could provide an axiomatic model for interpreting natural phenomena.

As explained by Stephen Edelston Toulmin, a refusal “of every particular knowledge in favour of the universal one” was articulated and any kind of unofficial or impure empirical approach slowly came to be overshadowed:

“The study of particular practical cases is replaced by that of universal principles. The study of the multitude of peculiar practical cases is replaced by general concepts; the concrete diversity of phenomena and situations gives way to the development of abstract axioms; all temporal knowledge, timely with respect to events and specific with respect to contexts, gives way in favour of a timeless one.”²

Through Worster’s definition, two approaches are defined: one being purely scientific, and the other being humanistic and all-encompassing, thus contributing to the shaping and distinguishing of the content of the Imperial discourse from Arcadian discourse.³
In the hydraulic discipline, and in the works of the protagonists who continued to explore the congenital fragility of the Italian landscape, the beginning of bifurcation between a purely mathematical approach and wider forms of knowledge is clearly discernible. In the century to come, Cristoforo Sabbadino, Marco Cornaro, and others, were followed by Benedetto Castelli, whose work is considered to be the first Italian hydraulic treatise in the modern sense.

However, treatises containing multitudes of knowledge, empirical interpretations, and solutions regarding water phenomena have continued to be valuable sources of information for a long time.

In fact, around the same years in which Castelli published his work, Giovan Battista Aleotti wrote his treatise on water management. Here he attempted to incorporate a broader system of knowledge into a compendium of informal and local practices, as well as including the first scientific knowledge inherent in the discipline. Therefore, Aleotti’s work can be considered an extension of the Arcadian discourse, demonstrating how it can encompass a wide range of genres.

While Castelli laid the foundation for modern science, Giovan Battista Aleotti demonstrated vividly the tension between closed and infinite worlds.

This unique approach continued to be followed by the Italian hydraulic school until the 19th century, even if the Italian approach was gradually swept away by scientific and technological advances. Despite this, it now represents a valuable treasure trove that is resonant with contemporary ecolog-
ical strategies used for strengthening the relationship between humans and the natural environment.

Comparing Castelli and Aleotti illustrates the nature of this bifurcation through their specific contents, drawings, and purposes.

5.2 Benedetto Castelli, Discourse of the Mensuration of Running Waters.

Hydraulic engineers, such as Alessio Degli Ajardi, Fra Giocondo, and Leonardo Sabbadino, found their historical successor in Benedetto Castelli, who came to standardise the hydraulic discipline. A mathematician and physicist, he was a close collaborator, disciple, and friend of Galileo Galilei. However, unlike his master, Castelli dedicated his entire life to the study of hydraulics. This work culminated in his writing of Discourse of the Mensuration of Running Waters, which is regarded as the first scientific hydraulic treatise. He established this discipline on an entirely mathematical basis, thus paving the way for the development of later theoretical scientific studies.

Castelli’s work emerges from an increase in political, economic, and practical demands linked to the peculiarities of the Italian territory. Venice was not the only Italian area affected by increasing environmental changes. The flooding of multiple rivers, such as the Arno, Tiber, Reno, and Po rivers,
had already demonstrated the fragility of the Italian territory on many occasions; for example, Florence was flooded three times by the Arno in 1547, 1557, and 1580. The Tiber flooded even more frequently, with the issue worsening throughout the 16th century. Additionally, areas surrounding Ferrara were transformed from navigable terrain into impassable swampland following the diversion of flood water from the Reno and the Po River. Moreover, the persistent instability of Italian geopolitics made managing territorial waters more challenging, due to shifting boundaries and political affiliations. The diversion of rivers, reclamation of lands, and construction of canals became increasingly important means of generating political power and economic prosperity. For this reason, rather than following the most environmentally beneficial route, technical decisions were often made with the intention to increase political power.

Such conceit is clearly evidenced by Leone X’s Pontine swamp project. When addressing these challenges, it became clear to Castelli that water management could not be considered purely from the empirical point of view. Instead, it was necessary to develop a theoretical science based on geometry and mathematical calculations.

Discourse of the Mensuration of Running Waters was published for the first time in 1628 and was followed by a second publication in 1660. Both editions were dedicated to Pope Urbano VIII. The text includes Castelli’s analyses, demonstrations, and suggestions for resolving the landfill of Venice’s lagoon, the flooding of the Reno near Ferrara, and
reclaiming the Pontine swampland. Besides Venice, Ferrara, and the Pontine swamps, on which Castelli provided written commentary, he also discussed other problematic regions and rivers, describing the causes of the Tiber’s frequent flooding, as well as the complex hydrography of the Chiana region in Tuscany.

On the one hand, whilst the descriptive parts of Castelli’s work remain significant, new terms are introduced and, although not yet formalised in mathematical proofs, they increase the geometric demonstrations which abstract natural phenomena in general spatial terms. On the other hand, the content of specific investigations is depurated from the contributions of other disciplines, including literature, philosophy and even technological knowledge related to hydraulic machines.

The discursive structure of Castelli’s text also differs from traditional treatises. Its scientific nature is immediately evident in the writing’s precise sequence and pace. Castelli poses a set of problems and questions, followed by explanations, demonstrations, and assumptions, as well as statements, theorems, and several corollaries. Similarly, the tone of the text, as well as its graphic representations, are dry and functional to this aim.

For instance, when compared to Leonardo da Vinci’s vorticose drawings of water, despite being considered Castelli’s real predecessor, the drawings of the latter show a very different approach to the subject. Leonardo’s drawings evoke the power of water’s current and flow by illustrating its move-
ments through swirling pencil lines that combine to produce gusts or currents across the page. (FIG. 2) By contrast, the material qualities of water, emphasized by Leonardo da Vinci, are completely ignored in Castelli’s illustrations in favour of pure geometric abstraction. (FIG. 1) There is no fascination with the materiality of nature as it is viewed as an object to be discovered through calculations.

As stated in the title, the primary objective of Castelli’s work was to study the physics of motion and how it applied to water. Previous studies had considered the motion of the sky and stars, animals, having already arrived at “a wonderful height of sublime understanding,” as well as the invention of “engines moving of themselves, machines moving by the force of the air, and those which served to move weights and immense magnitudes with a small force.”

Despite rivers and seas sitting closer to spaces of human habitation than the sky and stars, the motion of the water was still considered an “abstruse and hidden” subject. In response to this lack of knowledge, Castelli set the study of the movements of water in river systems and canals as his primary purpose. Up unto that point, they had not been observed much or considered, despite being of great importance to both “public and private affairs.”

Castelli took great care to assure an innovative nature of his work, which enabled him to anticipate issues and plan canal system diversions effectively. At the same time, Castelli seemingly aimed his work at a wider audience; he
divided his treatise into two parts in order to make it more accessible. The first part is directed at technicians who do not possess a solid mathematical background. Then, unlike the first part, where processes are carefully explained by describing physical experiments and observations, the second section is addressed specifically to mathematics experts and reveals the true scientific nature of his project.

Castelli begins his text by explaining his confusion and uncertainty regarding the motion of water which, on the contrary, seemed entirely clear to engineers and technical experts. Walking through the Paduan countryside, he comes across a waterwheel. Intrigued by the flow of water, he narrates his realisation that the most critical aspect of any interested research into the motion of water should be to obtain accurate measurements of the rate of flow. Prior to Castelli’s studies, related approximations had been based on two-dimensional cross-sections of rivers, which produced relatively inaccurate estimations. Castelli argued that the river’s volume should be determined by taking into consideration both time and distance as constitutive of a third dimension.

To make his argument more understandable, Castelli replicated the observed phenomenon using vases and ducts, observing the relationship between their dimensions, shapes, and the speed of water:

“And to explain all more clearly with an example; we suppose a Vessel filled with water, as for instance a Butt, which is kept full, though still water run out, and the water run out by two taps equal of bigness, one put in the bottom of the vessel, and the other in the upper part; it is manifest that in the time where in from the upper
FIG. 1 Benedetto Castelli, picture of two pages from the treatise, Discourse of the Mensuration of Running Waters. Here he outlines a schematic representation of an abstract flow of water, 1628.
Of Running Waters.

Proposition I.

The section of the same river discharges equal quantities of water in equal times, although the sections themselves be unequal.

Let the sections be A and B, in the river C; running from A towards B; I say, that they discharge equal quantities of water in equal times; for if a greater quantity of water should pass through A, than passeth through B, it would

follow that the water in the intermediate space of the river C, would increase continually, which is manifestly false, but if more water should pass through the section B, than enters at the section A, the water in the intermediate space of the river C, would grow continually less, and always ebb, which is likewise false; therefore the quantity of water that passes through the section B, is equal to the quantity of water which passes through the section A, and therefore the sections of the same river discharge, &c. Which was to be demonstrated.

Proposition II.

In two sections of rivers, the quantity of the water which passes by one section, is to that which passes by the second, in a proportion compounded of the proportions of the first section to the second, and of the velocity through the first, to the velocity of the second.

Let A, and B be two sections of a river; I say, that the quantity of water which passes through A, is to that which passes through B, as a proportion compounded of the proportion of the first section to the second, and of the velocity through A, to the velocity through B. Let a section be
part shall issue a determinate measure of water from the inferior part there shall issue four, five and many more of the same measure, according to the difference of the height of the taps, and the distance of the upper tap from the superficies and the level of the water of the vessel.” 15

By taking this step forward, Castelli departed from Sabbadino’s previous observations, which were based on personal observations and experiences, in order to formulate a scientific definition of the phenomena being observed. For the first time in this field, Castelli moved from an external, natural landscape to an artificial, internal one, which was made of vases and tiny ducts. This move signalled a turn towards modern technoscientific practice as it would emerge in the following centuries.

After completing his first artificial exercise in the abstraction of river dimensions through the usage of vases and ducts, Castelli attempts to instruct his readers through fourteen corollaries and eleven appendices, which outline easily observed natural phenomena that confirm his theories. He goes on to discuss how rain and wind speed affect the flow of water between tributaries and confluent rivers. Following these descriptions, he presents specific case studies that evidence his claims, focussing, for example, on the flooding of the Tiber near Rome. He explains that, unlike other similar events, this particular case of flooding was not caused by an increase in rainfall or by the rapid melting of snow; instead, Castelli argues, that strong winds prevented the river from flowing and functioning normally.

These observations are not only useful for under-
FIG. 2 Leonardo Da Vinci, water movement, study drawing, 1510.
standing natural phenomena, but also for designing interventions in river systems, through the construction of bridges and riverbanks. Regarding this, Castelli does not forego the opportunity to emphasise the failure of the architect, Fontana, in calculating and constructing a bridge across the Tiber in 1598. Castelli claims that Fontana’s failure was precisely because he did not understand the concepts of river flow and speed. A similar error in assessment due to a lack of sufficient scientific knowledge is also attributed by Castelli to the experts and technicians responsible for managing the waters around Ferrara. Additionally, in reference to the Adige, Castelli demonstrates how the properties of fluid motion are most crucial for appropriately designing embankments to prevent flooding.

Nevertheless, Castelli’s text does not end here. In the second part of his book, entitled *Geometrical Demonstrations on the Measure of Running Waters*, Castelli demonstrates to mathematicians and experts how fluid motion can be understood through the law of continuity, otherwise known as Castelli’s first law. Here, the language and structure changes again. The theoretical statements on the measurement of water result from the idea that the river, its bed, and its banks, can be understood as faces of a complex geometric figure: “The cross-sections of the same river discharge an equal quantity of water in equal time, although the sections themselves are unequal” (Proposition 1).16 Thus, in contrast to the first part of the text, the exterior world that was represented by the countryside where his investigation began, disappears and is replaced by an abstract geometric and mathematical landscape.
The second edition of Castelli’s treatise was published in 1660. Unlike the first edition, it included three new writings as a result of three assignments as a hydraulic expert: the Republic of Venice requested his expertise to find a solution to its landfilling concerns. Pope Urban VIII aimed to complete the unfinished Pontine marsh project and turn it into a viable agricultural resource for the papal state, while re-establishing the flourishing agricultural communities surrounding Ferrara and Bologna.

More so than in the main text, these reports, provided at the end of the second edition, allow for the examination of additional significant aspects. These reports reveal how the scientific investigations broke into reality, by colliding first, and later by being encapsulated in the secular political discourse.\textsuperscript{17} They demonstrate the impossibility of discerning matters of fact from political, social, and historical concerns, as well as the beginning of a loss of a collective dimension in favour of a specialised one, based on the concepts of certainty and rational formality.

5.3 Benedetto Castelli, *Considerations on the lagoon of Venice and other cases studies.*

In 1641, the Venetian Republic requested Castelli’s assistance in technically calculating the health of its lagoon, which at the time was still suffering from increasingly low
water levels, despite attempts on rivers and canals.

In this context, Castelli confirmed the increasing degradation of the lagoon in relation to its “notable discovery of the earth and mud.” Landfill process was a primary cause of the city becoming uninhabitable; mud emerged from the canals, which became clogged and unnavigable. The air also became unbreathable as the emerging mud was heated under the sun, releasing toxic fumes. The same phenomenon affected the harbours, particularly Malamoco, which was located in the central lagoon region on the south side of the city, weakening both its commercial opportunities and its defensive position.

Castelli examined two possible causes for this phenomenon. He wondered whether the landfill process was caused by rising ground levels or, rather, by the lack of water flowing from surrounding rivers into the lagoon, many of which had been diverted. Castelli argued that, whenever the flow of river water was insufficient to counteract the flow of seawater, not enough current was being generated to clean and sweep away mud from the canal bottom. In many cases, such as that of the river Brenta, the diversion of rivers away from the lagoon was not only inefficient, but also harmful. They interfered with the natural motion of water, both inside and outside of the lagoon, thereby preventing the natural removal of excess mud.

The Brenta River had been diverted three times, with the most recent occasion occurring thirty years prior to Cas-
telli’s work. From the lakes of Caldonazzo and Levico in the region of Trentino-Alto Adige, the river flows through four different landscapes and terrain topographies. It begins in an entirely mountainous region, adopting a fast and vigorous flow, until it reaches Bassano del Grappa (Brenta Superiore), where it enters a plane of high altitude extending up to Fontaniva. Here, it flows into a much broader riverbed, which slows down its morphology. The characteristics of the soil between Fontaniva and Ponte di Brenta (Padua) further slow the flow of water until the last 175 kilometres when it reaches the Adriatic, which is characterized by an extremely complex hydrographic system with numerous rivers. It is in this last section that most of the diversions of the Brenta were constructed. Since the lagoon’s centre was the greatest cause of concern, the Brenta, whose main mouth lay directly in front of the city of Venice near Fusina, was one of the earliest rivers to be identified as the source of the problem of landfill. (APPX. 5, 6, 7)

The cause of the landfill process, according to Luigi D’Alpos, was not only the transport of various types of sediments into the lagoon, but also insufficient flows of water unable to carry away such sedimentation. Additionally, the construction of embankments on Terraferma in order to prevent the flooding of agricultural fields increased as a practice, causing rivers to reach the lagoon without dissipating their volume of water by extending into adjacent areas. Some interventions, dated to before Padua, Vicenza, and Treviso, were incorporated into the Republic. These were primarily
designed to provide defence for the territory and failed to fully consider the management of water. It was not until the early 14th century that Venice would begin to consider an approach to water management in its broader sense, after defeating its rivals and taking possession of Terraferma. As an example of this, the Argine di Intestadura (embankment) was built in 1339, following on from the initial processes of landfill in the 12th century and marking the first form of protection for Venice. This embankment was located parallel to the coast, and was designed to divert rivers into canals, including the Brenta that was close to Venice.

During the 16th century, the Serenissima built up another canal, Brenta Nova, connecting the Brenta to Chioggia on the southern side of the lagoon. Marco Cornaro was the first to propose this diversion, initiating a debate which was later taken up by Sabbadino and Alvise Cornaro. In 1610, the Senate decided to intervene with yet another deviation through il Taglio novissimo del Brenta (diversion), which was closer to the coast and ran parallel to the previous diversion of the river. (FIG.3)

According to Fabio Zecchin, this new diversion carved out a straight path parallel to the lagoon, thus permanently dividing it from Terraferma. This event could be considered the first rupture in the concept of the lagoon as an ecosystem.

Based on his calculations, Castelli asserted that previous river diversions were designed according to rough and
inaccurate methods that did not take into consideration the dynamics of fluids, thus falling into a subtle deception that the right solution was found. Instead of reducing the landfill process, these diversion projects decreased the volume of water entering the lagoon. Taking into account the water’s rate of flow, Castelli suggested that reverting the diversion of the Brenta into the lagoon would have been beneficial to the canals, as well as improving the quality of air. His proposal was largely criticized; his opponents suggested that bringing the Brenta back into the lagoon would increase the amount of debris and mud caused by its turbidity.

It is interesting to note how *Considerations on the Lagoon of Venice* differs from Castelli’s other texts, being written with the intent of strengthening his public defence. Castelli was required to defend his thesis in public; an unusual process of cross-examination was carried out by technicians of the *Magistratura delle Acque* and officials of the Republic to evaluate his hypothesis.

Whilst Castelli was already a professor of notable standing at the University of Pisa by 1613, his scientific theories had to contend with many political perspectives and expectations at odds with the solutions he suggested.

Despite his efforts to adapt his texts to a specific audience, through assuming a more pragmatic approach, the tension between scientific and political priorities shines through in many passages of his argument. From the beginning, he reiterates that any possible remedy suggested, however effective, would not be able to restore the original, mythological status
of Venice. Since the lagoon would not remain “unchangeable and eternal”, due to the fact that everything necessarily “has its end,” he suggested two things: or to accept the fact that the landfill process was a relatively new process and would have a long course, but would erase any long-term future prospects for the city; or to lay aside “all affection or passion that self-flattering minds have entertained for their own conceits,” and replace the previous state of the art, in which rivers were not diverted, thus demolishing the hypotheses of two hundred years of previous attempts on which the Magistrato delle Acque and its members had consolidated their knowledge. 26

Clearly, Castelli overlooked, or at least did not want to be affected by, the political implications of both proposals. Though the debate may appear entirely technical, Castelli’s proposal raised a number of other concerns and issues beyond the scientific dimension. Despite his efforts, Castelli collided against the proud myth of Venice as an undefeated city in influencing its continued governance and policy decisions. This embodied its institutions, citizens, and physical and material structures. He focused on the lagoon, Venice, and its wider territory as matters of facts, rather than “gatherings” of concern, echoing Latour’s expression. 27

Moreover, the notion that deep knowledge and proper expertise belonged exclusively to Venetian technicians, who were backed up by laws based on a concept of civic care, was deeply embedded in the government’s thinking, making it difficult for them to accept Castelli’s work.

According to Piero Bevilacqua, this peculiar attitude
had its roots in Venice’s particular historical relationship with water. Comparing the Republic of Venice with the Netherlands, connected by similar environmental conditions, he explained how they came to shape opposite political, cultural, and even spiritual attitudes throughout history.²⁸ Several unforeseen and unstoppable natural events forced the Dutch to rebuild and reinvent, developing an attitude of spirituality that continuously strengthened every time they overcame the violence of nature. Consequently, their collective ethic and political attitude developed as a result of the conception of nature eternally in competition with human beings. As a result, it led to the development of a muscular approach towards nature.

In contrast, Venice had to cope with the gradual progression of natural events, most of which were caused by human beings, without expressing any revenge against nature, but rather a commitment to taking care of a unique and sacred landscape. As a result, the Venetian political decisions were more cautious in pursuing only one direction. They were taken in response to long processes of change, incorporating previous attempts and failures, and experimenting with several solutions. This inherited attitude could not have been removed easily without undermining the mythological aura of the city.

Following a fortuitous discovery in the archives, Pietro Daniel Omodeo confirmed Bevilacqua’s observation and demonstrated how Venetian political decisions were made, clarifying the factors that contributed to the Republic’s decision not to fund Castelli’s project. An unpublished edition
of Castelli’s work, including *Considerations on the lagoon of Venice*, was attached with other documents in the Republic’s evaluation of the lagoon’s health, which surveyed citizens and local fishermen. According to Omodeo’s discovery, citizens were not only responsible for maintaining the cleanliness of the city and its water according to specific laws, but were also expected to provide up to date information on the lagoon’s health, contributing with their unique knowledge and perspectives. “The active involvement of citizens and fishermen in the assessment of the state of the waters,” therefore, contributed towards the development of collective memories and strong relationships between citizens and the environment.\(^{29}\)

It is clear why Castelli’s proposal represented “a case of clashing styles of thought (between) mathematical abstraction against a ‘geological’ concreteness.”\(^{30}\) This point of tension can be productive for critical thought; on the one hand, it allows for “reflect(ion) on the problems linked to the connection of scientific theory and practice, as processes of scientific abstraction could make isolated problems better manageable while failing to concretely solve them in a satisfactory manner.”\(^{31}\) On the other, it illustrates how cooperation between both approaches, mathematical abstraction and ‘geological’ concreteness, would be a necessary and vital aspect of protecting the territory, even today.

Moreover, one last aspect seemed to slowly disappear in Castelli’s arguments: by focusing on a physical explanation for the motion of water, he ceased to consider Venice and its lagoon as a living organism. A unitary perspective on the
lagoon, even if based on a philosophical legacy, served as a connector between the natural world and the governance of territory. In contrast to this, the mathematical abstraction of the natural world established a degree of distance from the vivid materiality of the territory as a living organism. Consequently, most of the unconventional and localized knowledge was erased from treatises and gradually forgotten, in favour of general and abstract concepts.

In terms of conceptualising the materiality and animateness of water, and the importance of this for its effective management, Venice continued in the same direction. Rivers continued to be diverted, even though the results were less than satisfactory. In 1683, the Sile, which flowed directly into the lagoon from the northern coast, was diverted through canals into the old course of the Piave river, which had been previously redirected in 1647 through the Taglio del Piave canal (deviation). Although it did not flow into the lagoon, the Piave often overflowed into the Sile, which caused indirect damage to the lagoon. The canal relocated the river eastward, further than its original location. Upon completion of these three large-scale interventions, Sabbadino’s ambitious plans to divert all rivers away from the lagoon were almost fully realised. (FIG. 3a and 3b)

However, from the beginning of the 17th century onwards, the interests of the Serenissima started to gravitate toward the southern territories along the Po, which defined its boundary line with the Duchy of Ferrara.\textsuperscript{32} The complex
FIG. 3 Bernardo Zendrini, map of the diversion of the Brenta River, 1610.

FIG. 3a Bernardo Zendrini, map of Taglio del Sile. The diversion of the Sile River. 1683.
FIG. 3b Bernardo Zendrini, map of Taglio del Re. The diversion of the Piave River, 1641.
nature of this region was not only due to competition between two distinct political entities, but also resulted from geographical factors. Before flowing into the sea, the Po forms a large delta, consisting of numerous branches and swamplands. In approximately 30,000 B.C., the Po delta began to take shape, consisting of two main branches: the Po di Andria to the north, which flowed into the sea near Chioggia, and the Po di Spina to the south, which crossed through Ferrara and flowed into the sea near Ravenna. In Etruscan times (VI-IV B.C.), the first stream split into a second branch to the north, the Po di Fornara. The second branch was divided into two further branches, known as the Po di Volano and di Padoa. Such interventions mark the beginning of the transformation of the landscape over the centuries, characterised by the proliferation of rivers and the alteration of their routes, as is still ongoing today.\textsuperscript{33}

Additionally, the Po’s delta was an inherently complex region, having been largely affected by natural disasters and human activities which caused the rapid transformation of the environment. An extremely significant natural phenomenon occurred in 1152, when a large flood, known as Rotta del Ficarolo, caused a considerable impact on the general hydrological layout of the area.\textsuperscript{34} This caused the river to move northward into the Po Grande, which still represents the main branch of the Po today. As a result, the volume of water flowing through the southern branches (Volano and Primo) around Ferrara decreased, making the route less navigable and the area more susceptible to sudden flooding.
However, due to the proximity of the Po Grande branch, the Venetian lagoon faced an increased risk of flooding and landfill. The dangerous nature of this northern branch was greatly accentuated by the earthquake of 1570, which pushed large amounts of water and sediment into the lagoon; this increased the likelihood of landfilling at the harbour in Chioggia, located just 30 kilometres from the main river route. The management of water would require a broader understanding of the Po’s delta, beyond its role as a political border between the Duchy of Ferrara and the Venetian Republic which, instead, hindered the design of any environmentally beneficial solutions. After the incorporation of the Duchy of Ferrara under the influence of the Papal State in the beginning of the 17th century, making it an ally of Venice, the Republic was able to excavate the Taglio di Porto Viro canal in 1604; this reduced the probability of flooding and prevented the accumulation of debris within the lagoon. (FIG. 4 a, b, c)

Venice’s lagoon, however, was also constantly at risk, due to other river diversions constructed beyond its own territory. According to Cesare Maffioli, from as early as 1625, the Venetian ambassador’s delegation sought to learn about the Pope’s plans for the Taglio del Reno. Two separate occasions have been recounted: first, delegates met with Pope Urbano VIII and his closest officials to pay homage, and, secondly, Angelo Contarini represented the Republic in Rome between 1626 and 1629. The government were mainly concerned that a new canal would further damage the lagoon, inevitably causing changes to the political and commercial balance.
FIG. 4a Drawing of the evolution of the Po delta. Rotta di Ficarolo, 12th century.
FIG. 4b Drawing of the evolution of the Po delta. The Reno River’s diversion, 15th century.
FIG. 4c Drawing of the evolution of the Po delta. Taglio di Porto Viro (diversion of Porto Viro), 15th century.
between the territories, which had only recently been partially restored following the construction of the Taglio di Porto Viro.

Since 1450, the Reno was diverted several times, causing a reduction in the amount of water flowing through the southern branches of the Po’s delta, and instead transferring more water into its central and northern branches. This increased the risk of flooding around Bologna and Ferrara, exasperating their diplomatic relations. At the same time, this also indirectly increased the landfill process within the lagoon. In response to the tensions between Bologna and Ferrara, who were unable to reach any agreement, Pope Urbano VIII requested Castelli’s assistance in analysing the proposed digging of a new canal for the Reno, in addition to providing insight into the reclamation of the Pontine swamps. Castelli published both considerations in 1660 and, despite being based on the scientific notions described in his main treatise, his consideration of Pontine’s swampland was unusual in its pragmatic approach. Castelli stressed the importance of practical solutions over more radical options: clearing vegetation from drainage canals, which resulted from their inadequate maintenance; preventing buffaloes from crossing canals, which crushed vegetation on the riverbed and prevented the movement of water; banning fishponds, which also had the effect of slowing the flow of water; and, eventually, consolidating canal banks to augment the flow of water.\(^{36}\)

In contrast to this, within the text Consideration on reclamation of the Bolognese, Ferrara, and Romagna areas,
Castelli based his suggestions on technical evaluations and mathematical calculations of the water flow. He considered this the most appropriate method, stating “but to manage this enterprise well, it is necessary to measure the quantity of the water that the rivers discharge into the valleys, in the manner as I have demonstrated at the beginning of this book.”

Castelli had little doubt: these areas were frequently flooded, since the method of adding water into rivers, or of diverting rivers such as the Reno, had little positive impact if done without a correct understanding of the concept of water flow. As a result, “many rich and fertile fields were drowned under water, converting the happy habitations and dwellings of men into miserable receptacles for fishes: Things which doubtless would never have happened if those rivers had been kept at the right height, and the Reno had been turned into the main Po, and the other rivers to the Argenta and the Volano.”

Rather than echoing concerns about the living conditions of the peasants, to which the Ruzante had given a voice, Castelli seemed to describe the disastrous effects of the floods with extreme detachment, as if he were observing his own vases and conduits for calculating the speed of the water. One can just look at the words used: happy homes become containers. Consequently, the landscape becomes an object devoid of any sign of vitality and whose geometric characteristics are the most relevant aspects. One could dare to say that the word ‘miserable’, which was applied to the fish container, even has a negative connotation, resonating with an anthropocentric perspective.
Therefore, following the factuality of these considerations, Castelli hypothesized the excavation of a new canal along the Reno based on his mathematical calculations. This text included figures that illustrated volumes of water injected into rivers, whilst also providing an extensive discussion regarding alternative interventions, acknowledging both their benefits and disadvantages. In conclusion, numbers and calculations began to serve as a basis for decision-making, as well as actually engineering interventions in the landscape.

The Reno provided a context for Castelli where two essential approaches to hydraulic issues converged: one considered the science of water, while the other is known as the art of managing water. Castelli appeared as a pioneer of this first approach, although the possible application of mathematics to this discipline would not be entirely revealed until the 19th century.39

The second aspect was well represented by many Italian humanists who explored architecture, engineering, and other related arts, including water management. Notable figures, such as Vitruvius, Francesco di Giorgio Martini, Leon Battista Alberti, and Leonardo da Vinci,40 had a great influence on this historical period and form of study.

Following in the tradition of these figures, Giovan Battista Aleotti’s work, Della scienza et dell’arte di ben governare le acque, is of particular significance.41 Published within a decade of Castelli’s treatise, Aleotti’s work further illustrated the nature of the passage from a closed to an infinite universe, as described by Koyré.
Firstly, the work appears as one of the earliest Italian texts that addresses the science and art of managing water; Aleotti endeavoured to make his work accessible across the scientific, technical, artistic, political, and cultural interests of his potential readership, whilst focussing on the management of water, especially rivers. As an example, Aleotti’s expression, “the art of managing water” in the title, is significant in this regard, inheriting a form of writing and approach from earlier humanistic treatises, including Alberti’s *On the Art of Building in Ten Books*, as well as sharing Sabbadino’s affinity for local knowledge and practices. However, the additional inclusion of the term ‘science’ in the title of his text clearly expressed his intent to engage with scientific perspectives and incorporate the most up to date mathematical models.

In this sense, Aleotti’s work represents both one of the first hydraulic treatises *per se*, and one of the last for its broad disciplinary perspective. For this reason, with the establishment of hydraulic discipline boundaries, treatises such as Aleotti’s would go on to receive less interest and attention due to their broad disciplinary feature. In contrast, scientific and technical texts, such as Castelli’s, would become the most suitable responses to the political and economic needs of the following centuries.
Giovan Battista Aleotti was an Italian architect and engineer who worked for the Duchy of Ferrara, conducting numerous cartographic surveys of its countryside, facilitating its land reclamation and other projects, such as the restoration and construction of Ferrara’s buildings and walls, as well as updating its river management regulations. In light of the diverse nature of his work, it is not surprising that in 1600, along with other works, he wrote the hydraulic treatise *Della scienza et dell’arte di ben governare le acque*. Aleotti wrote his treatise on hydraulics by integrating knowledge from classical sources, which had previously contributed to the discipline through theoretical and practical insights; among these sources, Vitruvius was considered one of the earliest and most significant. Aligned with the classical authors who preceded him, Aleotti’s point of view was made very clear: hydraulics must be “subordinated to the civil architecture.” In these terms, he favoured a general approach where the concept of architecture still encompassed the wide variety of transformations of human beings, including the art of managing waters and the first forms of landscape design.

Consistently throughout the treatise, and most notably in the preface, Aleotti suggests to anyone who wants to learn about the art of managing waters that they should study drawing, writing, mathematics, and geometry. He claims it is
also necessary to develop an understanding of how machines and tools operate, as well as the legal matters regarding land ownership and boundary rights. Some knowledge of geography and topography would also be indispensable.

Aside from acquiring these skills, Aleotti also recommends that individuals adopt a noble and wise spirit, free of greed, in order to evaluate the results of one’s actions fairly, and avoid both public and private miserliness. Therefore, for Aleotti, the art of managing water extended to include an ethical attitude, which echoes Alberti’s reflections on human nature. He pairs the classical knowledges and this ethical sensibility with later scientific investigations, such as those conducted by Girolamo Cardano, a well-known mathematician who engaged in a wide range of subjects including medicine, astronomy, and hydraulics. Moreover, as a reflection of the humanistic approach, all of Aleotti’s observations are illustrated with accurate drawings and graphic schemes, which are provided alongside profound descriptions and poetic quotes.

Considering Aleotti’s affection for the city of Ferrara, serving the territory throughout his life, it is not surprising that his work contains many contemptuous political remarks, especially regarding Bologna and the former governors of Ferrara, who he accuses of serving the interests of Bologna. These political assertions appear only as excerpts, drawn from a longer discourse within Dell’interrimento del Po di Ferrara, written in 1598; in this text, Aleotti combines speculation on the cause of flooding in the Reno with explicit accu-
sations directed against Bologna, deeming them responsible for the damages done to Ferrara’s countryside. Aleotti’s accusations were technically correct; the diversion of the Reno caused swampland to emerge across Ferrara’s surroundings, making the Po branch inaccessible. These damages were not simply a consequence of technical errors or natural phenomena, but rather of political decisions made in favour of Bologna’s economy and land ownership, in conflict with the needs of Ferrara. The inclusion of these observations within Aleotti’s central treatise, reveals the degree to which he understood the art of managing water to be inseparable from political and social matters.

Aleotti’s treatise is divided into six chapters, the first of which examines water as matter, in terms of its various configurations across the earth, seas, lakes, and rivers. The second chapter focuses on rivers and appropriate methods for protecting their banks, followed by a description of methods for reclaiming land. Through the utilization of the archimeter, the fourth chapter is entirely devoted to notions of topography and the use of maps in the representation of the territory. In the fifth chapter, Aleotti discusses the legal dimensions of water management. The final chapter then attends to a variety of topics, which are presented randomly and across themes that are unrelated to his central subject, such as gardening and music.

Unlike Leonardo, who began his studies on water by attempting to explain its properties by way of a sort of atomic theory, or Castelli, who focused on the motion of water with-
out taking the physical nature of matter into consideration, in the first chapter, Aleotti avoids developing a disciplinary perspective on the subject. Rather, he attempts to convey his fascination with the beauty of waterscapes. An aura of wonder is encountered when one starts reading his book. This is thanks to his linguistic choices, narrative tone, and use of poetic references. Retracing the footsteps of classic authors, such as Virgil and Pliny, but also Alberti, Aleotti reaffirms how the possession of eyes and a mind allows us to engage with the wonder of nature. He considers this to be an essential approach for successfully managing water, preceding any disciplinary knowledge or requirement to learn related subject matter.

Throughout the first chapter, Aleotti switches between providing a sort of scientific explanation, and simply expressing his wonder at the “remarkable greatness of the waters”50 and their beauty. The immensity of water does not only refer to the physical dimension of rivers, seas, and oceans, but includes the places that water crosses and filters through, such as mountains and the soil, as well as its presence in other forms, including the rain, clouds, and mist.

This perspective is perhaps even more evident in Aleotti’s drawing of the terrestrial sphere, which is represented by a sequence of mountainous reliefs, and connected by rivers and seas which vary across its surface and subsurface.51 (FIG. 5, 6) In the words that accompany this drawing, Aleotti again reveals his humanist influences. To illustrate the complexity of this system and its interconnectedness with all other natu-
FIG. 5 Giovan Battista Aleotti, drawing of the Earth and its water system, 1600.
FIG. 6 Athanasius Kircher, Mundus Subterraneus, drawing of the water system on the Earth, 1668.
ral systems and living organisms, he metaphorically describes waterways in terms of the circulation of human blood around the body, echoing Cristoforo Sabbadino’s description of the lagoon of Venice. ⁵²

The sense of beauty is further enhanced by reference to Torquato Tasso’s and Petrarch’s poetry. Additionally, Aleotti adds religious overtones to his writing, emphasising his awe at the oceans and seas on Earth, and the immensity of such complex systems as they exceed human comprehension. ⁵³

In adopting a poetic perspective, Aleotti does not forfeit also providing informative content in his discussion of the Italian rivers. In particular, he devotes an extensive paragraph to discussing the Po, where he reviews the contributions of both classical and contemporary authors regarding the origins and nature of the river, in terms of its complex morphology.

At the time, the river was expanding via numerous tributaries and branches flowing from west to east, towards the Adriatic Sea. In this region near the sea, the river became increasingly muddy, slower, and heavier, until it approached its delta, which separated Ferrara in the south from Venice in the north.

After his description of the Italian rivers, Aleotti adjusts his narrative approach, replacing language that previously articulated his amazement at the noble river with extensive condemnation of the cruelty of nature. He firstly emphasises the dangers that Venice faced:

“(Venice) the emporium of Italy, virgin queen of the Adriatic Sea and, till now, the fierce enemy of whoever attempts to Italy. Even
Similarly, Aleotti expresses concern regarding the state of Ferrara and its territory, which was suffering a similar fate at the time. He argues that rivers (in this case, the Po) could become terrible and threatening, causing damage to cities, their residents, and livestock, completely transforming the surrounding landscape. He expresses particular surprise at how quickly the hydrogeological structure of a territory can change, resulting in even greater damage:

“Yet not that long ago all the mouths of the Po had very safe harbours with deep waters. We remember having seen them but what does not change with time? Let us, therefore, say that in a short course of years, so many harbours were submerged by floods so who knows what is going to happen in the future? Cities like Andria that was located along the sea. Or Ravenna, which was like Venice, lost all its canals.”

Moreover, following the massive flood of *Rotta del Ficarolo* in 1152, Aleotti argues that damage “neither by expense nor by toil can be taken away and with the time passing will become impossible to repair.”

Aleotti’s change of perspective, regarding nature as a disruptive force, could be viewed as contradictory to his earlier appreciation of natural phenomena. However, this point is immediately counterbalanced by his critical consideration of human interventions, which can cause even more damage. His tone and argument here echo Alberti’s and Sabbadino’s, evidencing once again the extent to which he was influenced
by earlier perspectives.

Aleotti provides further specificity to his arguments, recalling how the diversion of the Reno into the Po, as ordered by the city of Bologna in 1522, was driven by human greed. He identifies this as the most disruptive cause of Ferrara’s ruin. To demonstrate even more effectively how human greed was at the root of inappropriate decisions and actions, he compares the ancient transformation of rivers, as described by Tacitus, to the actions taken by his contemporaries. The ancient and contemporary examples do not differ in the principle that nature could be perfectible through the application of the human arts: “Nature has to be aided by art.”

Instead, they differ in the purposes for which nature is regulated. Ancient hydraulic transformations aimed to achieve a collective dimension. Contrastingly, contemporary projects are often driven by individual and private objectives. Compared to classical Greek and Roman examples, Aleotti claims that the transformations of Venice were not only expensive and useless, but also influenced by Venice’s interests, with little to no consideration for adjacent territories. Even worse, these transformations were driven by private interests.

“But what a great praise the Venetian lords deserve for defending the lagoon (impenetrable shelter of their city) not long ago, by diverting the Brenta and the Bachiglione at incredible expense, and for clearing swamps and ditches nearby the Brondolo by digging with bare hands? After that, not even 25 years passed before another worthy expense; they turned the Po, superb king of the waters of Italy and with such a great riverbed, to the sea on the right hand on the side of the Polesine d’Ariano; this project was praised from the beginning, showing in appearance that they were
doing so in order for the lagoon not to be altered but it came out that, behind such an idea, there were other kinds of not disclosed interests instead, both public and private.”

In these terms, he gives voice, even if briefly, to the inhabitants of Terraferma, as Ruzante had done in his plays. Moreover, he confirms the controversial purposes of Venice’s decision making.

Additionally, even when such activities are driven by a common purpose, Aleotti emphasises the importance of knowing how to enact them correctly. As a result, his remarks are often the result of the balance between ethical concerns, which tend to defend the collective dimension, and technical considerations. In fact, he opens the second book with this objective in mind. Here, he discusses how to properly construct and repair riverbanks, design river locks, divert rivers, defend cities and their surrounding territories, as well as how to shape the terrain along river valleys. His descriptions pay particular attention to Ferrara and its surroundings. Before defining different types of intervention, Aleotti provides a detailed analysis of the various morphologies of rivers in terms of their width, depth, slope and bed. He further classifies the different parts of a river, including the main channel and its tributaries, as well as explaining how accidental rivers and natural embankments are formed in nature:

“Nature is itself the best creator of art. It is clear that Nature directs much better waters than men do, especially when they do not know and do not want to regulate it; and it is so obvious that She probably teaches the waters how to run towards their end, following the line that for the shortest way goes marking its de-
scent, proportioning and deepening the riverbed and establishing its shelters as much as it can on either side, so that it can better and more unitedly reduce itself towards its end, which is the sea, without fearing that by other accidents its path may be impeded.”

According to his observations, Aleotti’s first objective is to establish a correlation between the morphological characteristics of rivers and the inherent risks they pose of flooding. He describes in a systematic and organised manner the most effective technical interventions needed for defending cities and their inhabitants against flooding. However, contrary to Sabbadino and Castelli, Aleotti places particular emphasis on the life of peasants and the primary sources of their sustenance, being their homes, lands, and livestock. The level of care and attention suggested here is comparable to the contributions of Alvise Cornaro and Ruzante, who both attended to the ways in which the fragility of an environment could negatively impact its inhabitants. It is, therefore, surprising that Aleotti is careful to consider not only the interests of cities and the nobility, but also those of the peasant classes and even animals. These considerations may have been influenced by Aleotti’s personal experiences working in these regions, and suggest a new understanding that underlines the social, political, and economic dimensions of the art of managing water.

According to this purpose, Aleotti provided an explanation of how soil carried by rivers can be used to remodel riverbanks which therefore can be seen more than a technical description. In designing new banks, plans and cross-sections
should be generated by accurate geometrical surveys, which respond to the differential heights and complex shapes of various steps and flat surfaces. (FIG. 7) According to Aleotti, this procedure would ensure that the surrounding lands were properly protected, minimizing soil erosion. (FIG. 8)

Riverbanks, however, were not composed of a single element, but rather of a complex structure that included flat parts that sat parallel to rivers. Thanks to this design, a certain amount of water could be allowed to overflow, in areas called *restare*; then, forming a secondary embankment further inland, *cornelle* were constructed in order to provide additional protection. In addition to reducing flooding, this type of flood control often served the additional purpose of creating new paths and buffer zones, which could be cultivated or reforested by landowners. (FIG. 9) It is interesting to note that the geometrical design and the practical execution of these structures were directly derived from military knowledge and the construction of defensive walls; “I can’t find any difference between protecting a river and protecting a city from armed enemies.”

In light of these words, it is natural to draw comparisons between city walls and riverbanks, which leads us to visualize the river, and by extension natural phenomena, as a dangerous enemy to be defeated in the battle for which it is essential to be well-equipped. As Aleotti was concerned for the lives of peasants, this equivalence certainly reflected his thoughts. However, recalling Sabbadino’s poetry at the beginning of his work, where he used the word wall to de-
fine the soft barrier of Venice’s lagoon, another observation can be made which mediates with another aspect shown by Aleotti in the first chapter: the fascination with waterscapes. This belongs to the naturalness of these elements, an aspect that is relevant within the conception of hydraulic machines at that time. Even if the artificial riverbanks were built based on military knowledge and according to defensive purposes, their conception still belonged to the natural system: they were made of modelled soil, carried by rivers or added, and designed in respect and following the soft and loose shapes of the rivers, as clearly demonstrated by the drawing of the cornelle. This resulted in a geological concreteness, joined with geometrical calculation, where the lines of the new riverbanks were drawn with care as they a soft veil or a new soil skin lean on the river.

This idea of naturalness was still present also in cases where the morphological characteristics of the river made it impossible to construct the artificial riverbanks described above. For this, Aleotti suggested an alternative method. This involved constructing wooden barriers to prevent riverbanks from collapsing under the force of water. Within the seventh chapter of the second book of his treatise, Aleotti provided a detailed explanation of these various techniques, categorised according to types of local soil, such as sand, gravel, and stone, as well as different sorts of native vegetation. In the simplest case, hedges were grown to create natural edges along the riverside, or a dense intertwining of vegetation created by planting willows, alders, poplars, or vines. Alterna-
tively, more robust barriers were built, consisting of vertical poles and horizontal elements. (FIG. 10) Contrastingly, when riverbanks consist of sand, Aleotti suggested using horizontal bundles made of willow branches, which are easy to fold, to serve as a natural barrier. (FIG. 11) In other cases, semi-wooded embankments were constructed with vertical and horizontal pilings, as well as stone and soil filling. As a result of the various challenges in the construction of these interventions, specific machines were needed. (FIG. 12)

All these traditional practices could be considered a treasure trove of informal pre-ecological knowledge, adding to the written testimony of Alberti and the graphic proposals of di Paulini. It could be revived and applied today as a way to bridge the gap between nature and culture.

However, this does not mean that Aleotti ignored the most significant scientific discoveries of his time. Despite this, Aleotti considered it essential to provide a theoretical background of the most relevant principles regarding the motion of water, before discussing more technical and practical aspects of its management. In fact, according to Alessandra Fiocca,\textsuperscript{62} the way in which Aleotti presents these, through formulas and geometric calculations in the first two chapters of the second book, suggests that he was at least aware of Girolamo Cardano’s teachings.\textsuperscript{63} (FIG. 13)

However, what makes Aleotti’s treaties relevant, is the capacity to integrate the various dimensions - political, scientific, social, ethical, and symbolic - into a single body of knowledge addressed to water management, suggesting an
FIG. 7 Giovan Battista Aleotti, the section of an artificial embankment, 1600.
FIG. 8 Giovan Battista Aleotti, artificial embankment reinforced on the outside due to natural erosion, 1600.
FIG. 9 Giovan Battista Aleotti, drawing of the technique to design new embankments, 1600.
FIG. 10 Giovan Battista Aleotti, drawing of vertical timber poles used to slow down the water speed and protect the riverbanks, 1600.
FIG. 11a Giovan Battista Aleotti, drawing of horizontal bundles to protect the riverbanks, 1600.
FIG. 11b Giovan Battista Aleotti, drawing of horizontal bundles and their location in the river, 1600.
FIG. 11b Giovan Battista Aleotti, drawing of a complex timber structure to support the riverbanks, 1600.
FIG. 12b Giovan Battista Aleotti, drawing of a machine used to drive the poles into the riverbanks, 1600.
inseparability between subject and object which provides an alternative conjugation of the Arcadian discourse. In particular, his discourse on water has poetic tones and includes social concerns, such as for populations and their environments destroyed by floods, alongside scientific and technical investigations. In this sense, although Aleotti’s work is not poetry, it recalls the richness of Virgil’s texts, embracing the three dimensions, physical, political and symbolic.

5.5 Methods of water management.

Aside from flood defences, the art of water management included the design and construction of locks and river diversions, as well as methods for raising water levels for agricultural purposes in marshland. When Aleotti wrote his treatise, at least three methods were used in Italy for land reclamation, including landfill, by drying, and the use of machines. Nevertheless, until Aleotti’s work, information regarding these techniques remained scattered and fragmented; specific practices were frequently incorporated into more generalised treatises or handed down from generation to generation within local traditions. The relevance of Aleotti’s treatise lies in the fact that it depicts a period that precedes the accelerated changes that were prompted by the Industrial Revolution. As a result, it represents one of the last testimonies to traditional land reclamation methods and hydraulic machinery, which
FIG. 13 and 13a Giovan Battista Aleotti, drawing of the geometric calculation of water movements and its speed, 1600.
was subsequently replaced by faster and more effective dewatering machines.

In the third book, Aleotti describes a method used to remove water from low places “per essicatione,” consisting of a canalization system that drains water away from the soil, taking advantage of its natural slopes.64 This approach was not new; Leonardo da Vinci had applied this design in his Pontine reclamation project of 1513, as shown by the famous map.65 (FIG. 23) Although Aleotti considers this the fastest and most efficient method, he recognises that it also requires a series of preliminary investigations that do not ignore mathematical science or topography. He describes the necessity of geometric calculations for designing canals and their sloping, in terms of their effects on the speed of water, as well as detailed topographies of a site. An in-depth study of the interactions between rivers, streams, and canals, which were intended to drain water, is also seen as essential by Aleotti. Finally, he also highlights a necessary consideration of the maintenance of canals and locks after their construction.

A second method, “per repletione,” is decried by Aleotti as a “lengthy, expensive and tedious” process, which is also often ineffective, despite the long-standing tradition behind it.66 This technique, known as colmata (reclamations for flooding), had been previously used by the Etruscans and Romans, as well as monastic orders in the Middle Ages. During the 19th century, this method was fully replaced by water pumps and machines, which, although more efficient, had a significant impact on the land, since it allowed to reclaim
of a huge extension of swamps quickly. *Colmata* is an Italian term used to describe the landfill process of allowing silt and water to settle in swampy areas, thus raising the ground and transforming the mud into fertile soil. This process applies the effects of natural phenomena, such as landslides and river deposits, to the creation of artificial ponds constructed from ground or wood embankments. These are called *bacini di colmata* (reclaimed basins) and are specially designed for this process, which allows water to travel into the pond and slowly settle the sediments. Eventually, the leftover water is channelled into the sea. As a result of its characteristics, *colmata* can be considered the least impactful hydraulic process as it allows a slow adaptation to the surrounding environment. Despite this, it can take many years - sometimes more than a hundred - to complete and reap the benefits of land transformation.

Val di Chiana provides a case study that is rich in historical evidence. While Venice was preoccupied with regulating its first reclamation project around the lagoon, the area in Tuscany between Arezzo and Siena also became subject to frequent debate regarding water regulation. Several experts were involved over many centuries. These included Leonardo da Vinci, who made a drawing of the area which mapped out a system of canalizations in 1502, the famous mathematician E. Torricelli and, finally, Vittorio Fossombroni, who recommended “*colmata*” as the most efficient method.67

In the endless attempts to reclaim the Pontine marshes, technical factors were partly responsible for making these
two methods – “per essicatione and per repletione” – more
difficult to apply. Additionally, conflicts between landowners
often hampered any technical interventions. It is not coinci-
dental that the implementation of reclamation projects was
often driven by strong political designs, which caused long
processes of negotiation and debate. On the contrary, hydrau-
lic machines avoided any infringements on land ownership,
and thus were increasingly used for reclaiming land. Howev-
er, for cultural and geographical reasons, it took Italy much
longer than other countries to commit to the use of hydraulic
machinery. A detailed account of the drawn-out process by
which machinery came to eventually be used across Italy is
provided below.

5.6 Hydraulic machines.

In the twelfth chapter of the third book of his treatise,
Aleotti describes nine types of hydraulic machinery: one is
designed to lift water from the lower riverbed for fertilizing
surrounding lands; another is used to dry out flooded lands;
and others are used to construct foundations when building
on flooded plots, as well as to dig canals through swampland.
(FIG. 14) Intended for specific tasks according to different
soil types, such designs were intrinsically related to the lo-
cal environments where they were used. For example, Aleotti
described how the first machine was used to dig channels in
swamps, indicating it would have been most often used in Valli di Comacchio.68

Among these machines, Aleotti drew the cochlea. With its simple circular motion, it became one of the most well-known69 and effective devices at the time for drying up swamps, creating fertile land, moving water, and digging tunnels into mountains for extracting metals.70

It is interesting to note that Aleotti takes great care when describing the method of raising water in which machines are activated through the force of four, six, eight, or even more men, with their feet in the water, as an illustration of the difficulty and energy required to perform these land transformations.71 As already highlighted, Aleotti was not new to this kind of observation which expressed empathy for peasants and their hard-working lives. In the previous chapter – on ways to dry up flooded areas – he addressed similar concerns regarding the conditions of life for human beings, which becomes a springboard for explaining his wider point of view on the purpose of the art of water management and its relation to nature:

“Necessity, teacher, and creator of beautiful wisdom, has strained many people who suffer floods of rainwater in their already fertile countryside by various accidents, to go investigating the aids of art. Where nature could not provide them with sufficient remedy or where they lacked the help of nature, they have learned how to provide for themselves with art.”72

Aleotti’s statement is more conciliatory in comparison with Alberti’s and Barbaro’s interpretations; nature does
FIG. 14 Giovan Battista Aleotti, drawings of nine different types of hydraulic machines, 1600.
not have to be conquered by art, as suggested by Barbaro, and Alberti’s concern for humanity’s destructive attitude also appears less consequential for Aleotti. Rather, Aleotti utilizes the verb “help” to identify a different and ideal nuance regarding the interrelationship between nature and art.

Despite appreciating the orderliness of nature, Aleotti recognizes that “imperfections” may still occur. Here, he assigns to art the task of filling in this gap, by developing machines that can “help” humans cope with natural catastrophes and improve their living conditions. Aleotti’s use of the verb “help” is not a random choice; he believes that the primary objective of art should be to help. For instance, when “fields do not bear fruit, peasant families unaccustomed to earning their own bread are usually reduced to a miserable state. It is therefore imperative to run away from the horrible monster of poverty.” Again, Aleotti places particular emphasis on the day-to-day lives of farmers and their quality of life, extending the social implications of the water management strategies beyond their technical ones.

This aspect makes his treatise a very valuable historical document, as it illustrates the gradual integration of social factors into the design of landscapes. This kind of attention and care shifted perspectives, even regarding the use of Aleotti’s own cochleae. In explaining the political and economic purposes of Venetian land reclamation, he highlights how these transformations were intended to profit Venetian families and their houses, rather than being driven by consideration of the needs of farmers and concern for the wider
territory. These observations also shed light on the role played by art in transforming land, which was still perceived as an ambiguous and problematic point of debate. Although the acceleration towards the modern concept of technology was already mapped out, the concept of the machine still embodied the concept of naturalness, still obscuring the dangerous side inherent to the *techne*, which would serve extensive exploitation of the natural world, as Alberti had already glimpsed. The concept of the naturalness of machines can be traced in at least two aspects: the way in which they were represented and the classical philosophical idea from which they derived.

As previously mentioned, Taccola and Francesco di Giorgio Martini were among the first to invent new machines and outline their systematic organisation in treatises. Taccola became very well-known for his publication of *De ingegenis* and *De machinis* in 1449, in which he selected and illustrated, for the first time, many of the machines described by Greek mathematicians such as Heron, as well as Latin military authors such as Vegetius. His drawings enabled craftsmen, artists, intellectuals, and even politicians to become familiar with the art of machines and their utility. However, most of Taccola’s machines are illustrated by hand rather than by use of rulers, producing relatively inaccurate drawings that failed to indicate specific measurements, dimensions, and materials. Rather than detailing the technicalities according to which machines were constructed and used, Taccola represents their place within the surrounding landscape, alongside the workers who operate them. This illustrative choice could suggest
that machines were still seen as part of the natural realm and not in opposition to it. In fact, even with a different hierarchy between human and non-human, the first, including their machines conceived as their extension, were part of a single dimension which included all of them. This conception avoided reducing machines to a source of danger which could disrupt their fragile balance.

In 1478, Francesco di Giorgio Martini’s treatise, *Trattato di architettura e ingegneria e arte militare*, not only expanded upon Taccola’s preference for hydraulic machines by presenting many devices, - such as levers, mills, war machines, winches, cranes, and vermicelli - but also took an additional important step forward. He includes several highly accurate drawings of machines which are extrapolated from their contexts; the surrounding landscapes that backgrounded Taccola’s drawings disappear, and perspective is carefully manipulated to make certain dimensions and mechanisms more visible. Francesco di Giorgio Martini describes several hydraulic machines, though more so in terms of how they work than their construction:

“Another method we can use to raise the water is to build a hopper boat, which has 30 sockets at the bottom, two of which are made of iron and two of which are twisted, allowing to pull water or mud and bring it to the top. The hopper boat has an oblique, round, vacuous, stationary box in which a covered screw is placed, as well as two iron and two twisted sockets.”

According to Pamela O. Long, this work, as well as others of the period, represent a novel attempt aimed at
satisfying both specialists and non-specialists, which marks a turning point in the history of humanistic culture.\textsuperscript{76} In this change was already implicit the idea that machines would require a principle of industrialization and reproducibility to increase their efficiency. (FIG.15)

Aleotti’s drawings still exhibit this concept of naturalness, failing to include any information regarding measurement and materials. Even his text describes their functionality very briefly. Therefore, it becomes clear that, machines were primarily conceived as secondary devices, constructed using inherited, local, and non-engineered processes, namely an informal technological culture.

Further technologically hindering the development of machinery, was the persistence of a classical philosophical conception referring to the relationship between human beings, machines, and nature. According to William R. Newman, the \textit{Mechanics}, which was one of the most influential Aristotelian\textsuperscript{77} texts during the 15th and 16th centuries, divided the interaction of art with nature into three categories:\textsuperscript{78} arts that operated by \textit{mimesis}, such as painting, sculpture, and architecture; “perfective arts,” such as medicine or agriculture; and the art of mechanics, aimed at “conquering nature” by overcoming its obstacles and acting against it.\textsuperscript{79} Despite this division, Newman argues that these three perspectives are intrinsically linked. The art of mechanics suggests a principle of naturalness whilst involving two levels of artificiality, in terms of both its products and its effects on nature.\textsuperscript{80} The reason for this interlinking can be found in the fact that ma-
FIG. 15 Francesco di Giorgio Martini, drawings of various types of machines, 1478.
chines - mainly levers, pulleys, and scales - were conceived as having originated from observations of natural phenomena, or from the movements of animal and human bodies. This was then followed by an imitation and translation of natural processes into functional objects, without deeply changing their matter or the elements they interacted with.\textsuperscript{81}

The term ‘conquer’ did not dislocate transformations outside the natural system; nature could be copied, transformed, or conquered, but it was not fundamentally altered, even if these former concepts were the philosophical presupposition of its distortion. As a result of the ambiguity surrounding this term, it was difficult to distinguish between transformations that “bested” nature and those that “replicated” or profoundly modified it.\textsuperscript{82}

Additionally, Alexander Koyré provides a further convincing explanation for why mathematics and numbers were not yet wholly applied to an understanding of machines, leading with the question of why the machines were born in the 17th century and not twenty centuries earlier.\textsuperscript{83} According to Koyré, the answer to this question can be found by considering the legacy of Greek culture. Up unto the 15th century, this hindered the impossibility of understanding the art of machines through the lens of modern physics, and its rigid, precise notions of mathematics.

Based on Koyré’s reasoning, accuracy was acceptable in the Greek world when referring to the movements of celestial bodies and their sphere. Except for instruments used to measure distances, angles, and weights, it was impossible
to mathematize the earth’s movement.\textsuperscript{84} This inability defined “a profound opposition of the celestial world and the earthly world, the world of precision and the world of more or less,” which slowed “the intellectual revolution that gave rise to modern science and in which the precision of heaven descended on earth”\textsuperscript{85} Rather than the absence of numbers indicating the absence of measurement, “machines were not calculated,” since the ordinary world at that time was not steeped in mathematics. The development of technology was the result of accumulative innovations and improvements, which followed many failures as well as more practical and local observations.\textsuperscript{86}

The slow progress of technology was also caused by other factors, especially when compared to other disciplines, such as the study of water regulation. According to Ciriaco, the use of machinery in Italy, such as mills, was not as widespread as in the Netherlands; a factor that contributed to its relative lack of significant progress.\textsuperscript{87} The weather conditions – the wind in Italy is less forceful– together with the preference for drying and landfill approaches, which were rooted in the traditions of monasteries, made the development of machinery such as mills even slower. As noted by Nicoletta Marconi in her examination of the anthology by Giuseppe Borgnis, published in 1826 and containing the discussions of Italian writers regarding the motion of water, we can observe how technological progress was limited throughout the previous three centuries.\textsuperscript{88}

Furthermore, another reason for this stagnation was
that technological development consisted of disparate individual inventions by scientists, engineers, and anonymous citizens, often proposed and submitted to the city administration.89 This process was far from facilitating a coherent, structured body of knowledge that would be essential for defining a modern discipline.

One of the most well-known examples of hydraulic machines is a text by Giuseppe Ceredi, entitled *Tre discorsi sopra il modo il alzare le acque da’ luoghi bassi* and written in 1567.90 His text is another valuable historical record of a type proto-technological text that still had strong links to Renaissance humanism. The text works through a dual register; on the one hand, it functions primarily to present the subject in a more extended manner that reflects wider cultural concerns. On the other hand, as shown by a few illustrations and annotations, his work also aims to introduce new observations in the technological field.

In order to fulfil this dual function, the content of Ceredi’s text is divided into three parts, consisting of different arguments. Importantly, these arguments do not directly address the underlying technological issue of raising water levels immediately, but rather present parts of the issue to the reader gradually. The history of the cochlea is primarily described by reference to Vitruvius’s contributions; Ceredi discusses the positive and negative aspects of this machine, before discussing other proto engineers that were active during this time. In the second part of his text, Ceredi turns towards the more technological aspects of machinery, which are described with
great generosity, despite often appearing redundant. Through drawings, he illustrates the technical details of some handles, depicting how they should be shaped to facilitate easy access for turning a screw. Even though these drawings appear simple, closer examination reveals a significant detail: they are superimposed with geometric diagrams. These diagrams serve to evaluate the efficiency of these handles and the technological advances that would result from such improvements. They indicate that a need for further detailed technological information was already being considered. (FIG. 16) A few pages later, Ceredi illustrates three kinds of cochlea across separate drawings, which differ depending on location, the depth of a river, and whether they are powered by hand or by horse. (FIG. 17, 18) His own words also provide some interesting insight into why he provided such illustrations:

“(…) the following illustrations have not been drawn in perspective with their backgrounds and shadows. By this technique, it would not have been possible to determine the actual dimensions of the parts. However, many things that would not have been visible based on the perspective have been depicted almost upside down in a way that allows them to be seen.”91

Ceredi understands that the use of perspective is not appropriate for providing accurate dimensions of machines and their components, as applied in these kinds of drawings.92 With this observation, Ceredi advances an understanding of how the technological dimensions of hydraulic machinery should be represented; drawings of mechanical parts needed a specific and appropriate representation, such as a two-di-
FIG. 16 Giuseppe Ceredi, diagram of cochlea’s handle, 1567.
FIG. 17 Giuseppe Ceredi, drawings depicting two types of cochlea based on the water level, 1567.
FIG. 18 Giuseppe Ceredi’s, drawing depicting the cochlea being activated by horses, 1567.
FIG. 19 Galileo Galilei, picture of two pages from the treatise Mechanics. Drawing of the calculated angle useful for operating the cochlea, 1660.
His Mechanics.

[Text is not legible due to the image quality.]
mensional, cross-sectional plane, which would enhance the efficiency of their construction, acting as a basis for rough calculations, and their reproduction.

However, in discussing specific applications of the cochlea and their benefits to individual readers and political institutions, the naturalistic aspects of Ceredi’s views on machinery appear persistent. Their movement, he claims, is already patterned in nature - in plants and animals, and in how they overcome gravity through spiralling. Rather than an artificial object whose purpose is to transform nature, the cochlea is portrayed as an object so natural as well as artificial:

“Now that I speak about proportions and about the most powerful and useful example of it, the cochlea, one can clearly see that its motion facilitates the climbing inherent to almost all things in nature, as well as artificial. The spiral sunrays like the motion of coils (...) some animals when they climb a mountain, or a slope, (...) or the snakes when they have to climb the top of a tree, (...) the flight of a kite and other birds...or plants. (...) Therefore, besides imitating nature, the cochlea also has the artifice of inclination, which makes it exceptional in its efficiency.”

A first shift in this conception is visible within the work of Guidobaldo del Monte, who was a godfather of Italian mathematics, as well as a mentor and friend of Galileo Galilei. He wrote two influential works in particular; Le Mechaniche, published in 1577, and Cochlea, published in 1615. Even though understandings of the cochlea had changed little from a technological point of view, del Monte instead sought to address their marvelous workings from a more physical point of view - as we would call it today - to conceptualise
the mathematical and geometrical rules that governed its operation.

A glance at the illustrations contained in del Monte’s text is enough to recognise significant changes in how technology came to be understood and represented. The cochlea is described using geometric abstraction, including points, lines, and volumes, with an emphasis on finding the correct angle of inclination in the geometric design of the helix. While quoting the Aristotelian concept of naturalness, he includes a fourth and entirely new relationship between art and nature that had not been previously considered:

“As we learn from Aristotle, art follows and imitates nature in three ways. Art imitates nature like a great painting does, or helps it like medicine does, or even surpasses it, as happens in mechanical engineering. The evidence now suggests a fourth way: sometimes art does not really follow nature itself. If it is true that art causes nature to produce its natural effects, but also the opposite can happen. That weight, which by nature tends downward, instead goes upward. In this case, how precious mathematics and especially mechanical engineering are, from which one can learn mostly everything.” 95

Del Monte does not deny the primacy of nature as a model for mechanics but rather highlights the fact that opposite and extraordinary effects, such as the cochlea’s ability to lift water, are possible if natural principles are understood through mathematical calculations. As a result of geometry and mathematics, the secrets of the natural world are revealed without destructive effects, and instead gesture to a sense of wonder; the ability of art to act against natural laws, once understood, opens the door to human transformations that were
previously unconsidered. This evolution can be seen several years later, as Galileo Galilei published *Le Mechaniche* in 1638, which also included a chapter on cochlea. (FIG. 19) In reiterating del Monte’s arguments, Galileo emphasises that machines cannot deceive nature. Although the effects of machines may appear unnatural, their causes are consistent with natural laws. However, in shifting his focus from machines to the force that propels them, Galileo is able to discover the connections between factors such as speed, time, and matter, across the supposed distinction of natural and artificial elements. This reveals the true causes of machinic functioning, and therefore presents the possibility to reproduce and improve technologies further. This understanding then represents the essence of one of the most important physical principles, which determined the passage from “*Du monde de l’à-peu-près*” towards the “*universe de la precision*.”

In fact, as claimed by Koyré, Galileo’s studies grounded “the practical use of number and weight, of measurement in the imprecision of daily life (...) to make it an element of precise knowledge.” However, Koyré also suggests that it is not Galileo, but Descartes, who clearly and distinctly formulated the main principles of a new science. He opened up “the possibility of converting theoretical intelligence to reality. (...) from this conversion of theory to practice, Descartes maps the progress that will make man the master and possessor of nature.” As a result, “the world created by the Cartesian God, that is, the world of Descartes, is by no means the colourful, multiform and qualitatively determined world.
of the Aristotelian, the world of our daily life and experience, (…) but a strictly uniform mathematical world, (…) There is nothing else in this world but matter and motion; or matter being identical with space or extension, there is nothing else but extension and motion.”98

The concept of naturalness, which persisted with the art of mechanics, involved other forms of art, such as cartography which, however, was similarly undergoing a significant change toward the modern discipline around the 17th century. This change did not only involve the establishment of disciplinary boundaries, but also the relationship between the art of mapwork and the perception of nature as a landscape. For this reason, the investigation of those authors and their techniques of mapping, before this evolution occurred, provides insight into pertinent aspects to understand other features of the Arcadian discourse.

5.7 Maps.

The art of mapping has been subject to theoretical and practical developments, tools, and techniques over time. Leon Battista Alberti had already accomplished a historical breakthrough by the time he published Delineation of the city of Rome, demonstrating an innovative method for mapping cities and surrounding areas through the application of tools invented by him.99 The map he produced of Rome is consid-
This can be demonstrated by comparing Paolino da Venezia’s map of 1321 with Alberti’s map of 1432. At first glance, their differences are quite evident. More than any other feature, the circle, which is present in both maps, reveals their two different cultural perspectives. In Paolino da Venezia’s map, the orography and buildings are included inside the encircling wall, which represents Rome as the centre of the universe both physically and symbolically. (FIG. 20)

On the contrary, Alberti’s use of the circle within his map is more complex. Besides representing the wall and the centrality of the city, when looked at more carefully, it represents the horizon, the innovative tool used to survey Rome. Beyond suggesting his cultural proposal for Rome, through this detail, Alberti articulates his broader conceptions of the art of building. The map also incorporates the idea that the city could extend beyond its defensive boundaries, implying the possibility of future changes to its scale. (FIG. 21)

Following Alberti’s map, several other maps of Rome were produced, but only very few described the topography of the city’s countryside. Among these, the most well-known maps were Efrosino Della Volpaia, drawn around 1547, which represented the countryside outside Rome, and Leonardo da Vinci’s mapwork for the Pontine reclamation project, around 1513. (FIG. 22 and 23) Leonardo da Vinci’s map is particularly significant as it represents one of the first chorograph-
ic maps, which would only become more widespread many years later.

Chorographic maps contain natural, topographic, hydrological, and artificial elements that are representative of a vast geographical area. This technique, which has been developed over the centuries, has proven particularly useful in this kind of project, such as the reclamation of swampland, highlighting the interplay of potential future transformations within a particular site. However, compared to what has become the standard cartographic discipline today, Leonardo da Vinci still combines both topographical and pictorial aspects, as pointed out by Moshe Barash in his article “Cristoforo Sorte as a critic of Art.” According to Barash, Leonardo’s maps do not “(...) give us a ‘Churchtower perspective,’ but a global view which approximates the effect of aerial photography. The view, however, is not actually taken in mid-air but conceived in the imagination. It has rightly been stressed that drawing a perspective map of a vast region was tantamount to a mental reconstruction of a bird’s-eye view and therefore involved the exercise of artistic phantasy.\textsuperscript{102}

Many years before Barash, this pictorial and imaginative aspect of Leonardo da Vinci’s mapwork was described beautifully by Mario Baratta as a “\textit{cartografia parlante.}”\textsuperscript{103} However, he did not provide a direct explanation of this expression. Therefore, understanding Baratta requires concentrating on the use of the term eloquent which is accompanied by the word accurate to describe the map. The two terms could sound like opposites. The map, Baratta claims, is indeed ac-
FIG. 20 Paolino da Venezia, map of Rome, 1321.
FIG. 21 Leon Battista Alberti, map of Rome, 1432.
FIG. 22 Efrosino Della Volpaia, map of Rome and its countryside, 1547.
curate, even though Leonardo did not have access to the tools of today and instead mistakenly used a pictorial perspective, which impaired the direct measurability of his drawings. Despite these factors, his map is still capable of presenting a place in detail, since it incorporates an understanding of the place that is informed by all aspects and, above all, the quality of an environment, including its atmospheric and affective dimensions. Natural and artificial elements are determined by their spatial relationships and qualities of matter, rather than by their geometrical measure. For instance, the mountainous promontory of Circeo, which is compact and calcareous in nature, features a uniquely curved profile toward the sea and land; the mountainous region is depicted by its picks and valleys, reaching out to embrace the dense forests that cover the central plain. Different outlines are used to identify the watercourses. Of course, this aspect was due to a lack of technological capability. However, unlike modern cartographies, Leonardo da Vinci’s map introduced a blending between pictorial and cartographic approaches, which avoided geometric precision in favour of a more complex felt sense of place. Therefore, Leonardo da Vinci’s map is called “parlante,” and accurate at the same time since it conveys much more than just the morphological and topographical characteristics of the region. It captures the essence of the region. This was sufficient and effective for Leonardo da Vinci to demonstrate that his project was in accordance with environmental characteristics.

Leonardo da Vinci’s map exemplifies the state of the
FIG. 23 Leonardo da Vinci, map of Pontine swamps, 1513.
art of mapping; in the middle of the 16th century, mapwork was still deeply entwined with painting, since the landscape was still considered a secondary subject and used as a background in both.104

However, since Alberti’s inventions, techniques and tools have evolved for defining heights and distances within a territory in order to determine the exact location of objects. The transition to more refined methods was also accelerated by an increasing need for accurate maps to regulate rivers, lands, and boundaries. Additionally, the increased enclosure of collective spaces further required refined mapwork. Undefined areas could not be accepted. On the contrary, it was necessary to measure lands, and draw their outlines to define their landowner unequivocally and separate the public regions from and private ones. As a result, there was an increasing geometrization of the territory, both concretely and culturally.

These events can be conceived as indirect effects of the conceptualisation of nature as a domain to be conquered and appropriated from a cultural standpoint. Therefore, the more accurate maps were, the more useful they became for describing the quantitative and less qualitative dimensions of place in an indelible manner, for regulating future activities.

It is not surprising that, according to Roberto Almagià, Venice was the first to recognise the need for such change. Venetian authorities began mapping the surrounding area around Padua, Brescia, and Verona as early as 1450.105 As already described, the specific political and historical circumstances under which the Republic of Venice operated at
the time, likely contributed to the acceleration of this process. Knowledge of the territory and its boundaries served as a defence against external invasions and helped improve the efficiency of new institutions involved in land reclamation. This was to be achieved by ensuring accuracy and extending areas of consideration. Both aspects required tools, not only for designing these transformations, but also regulating boundaries and land easements. As already noted in Paulini’s treatise, the enclosure of areas had a particularly adverse effect on the mountainous areas surrounding Venice, which had otherwise been left for local communities to use for a long time.

A little-known story relates to the forests of Montello, which lie above Treviso in the northeast, approximately 40 kilometres from Venice, which were used by the Serenissima for building its ships. According to Pietro Bertolini, this area was an object of communal ownership, along with its surrounding pasture lands - a legal status not typical of Italy but imported from German law. In this environment, a community was shaped that was intimately tied to its sense of place. Economically, communities would benefit from the products that these areas offered, such as firewood and hay. Politically, as Bertolini reports, laws were enacted with the aim to protect pascolum communis and guise villae (the forest) which surrounded the villages and communities.

Even after these territories became part of the Republic of Venice at the end of the 13th century, this scenario remained unchanged until 1471, when Venice decreed the use of these areas for the purpose of foraging lumber for the Arse-
nale and the building of its ships:

“Any oak tree was not only declared to be the Serenissima’s property and not subject to indemnification; the ground on which it had grown was also doomed to continue producing oak trees forever. (...) It was mandated that the rule against cutting down oak trees be reaffirmed in each villa, on ten fields owned by the council, and on one hundred acres owned by private individuals.”

After this first step, Venice established a number of laws and regulations that further restricted the rights of individuals and communities who lived amongst forests and pastures, thereby altering their historical relationship with the territory. Activating expropriations and drawing new boundaries led to a series of conflicts between locals and the administrative apparatus, forcing Venice to further expand its control and domination over the territory. Therefore, maps played an important role in preventing abuses and infringements, particularly in those lands which belonged to the Serenissima. In this sense, they were fully becoming tools of power for modern states-nations.

It is interesting to note that, although there was a type of colonization in the mountain territories that distorted the legal status of its original inhabitants, the greatest extent of the exploitation of forests occurred in the centuries following the fall of Venice (1797), when neither the local inhabitants nor the stringent needs of the Serenissima for timber sources could protect these areas from being exploited for economic purposes. Somehow, these maps had an ambivalence, as they served as tools of power as well as of care and sustainability.
of the territory.

However, in this period of transition, Cristoforo Sorte’s maps and writings can be considered a historical turning point. Juergen Schultz claims that Sorte is a direct successor of pictorial approaches inherited from Leonardo da Vinci. Cristoforo Sorte was born in Verona in 1510, where he began his career as a painter before becoming a superintendent for *Beni Occulti* and *Savio ed Esecutore delle Acque*. As a contemporary of Sabbadino, with whom he shared similar responsibilities at the Venetian institution, he was distinguished for his undisputed skills as a cartographer.

In 1578, as part of its first territorial campaign, the Republic of Venice commissioned Sorte to draw a series of detailed maps of the territory that surrounded the city and *Terraferma*. Initially, Sorte’s assignment was to create a giant map (10 metres by 4 metres) for a public audience in the *Grande Sala dei Pregadi* at *Palazzo Ducale*. In the end, due to confidentiality issues, the scale of the intended map was reduced. Instead, a further five maps were created that depicted additional regions on *Terraferma*: the Bergamasco territory (1586); the Fruili region (1590); the Bresciano territory (1591); the Veronese and Vicentino territory (1591); and the Padovano and Trevigiano territory (1594).

Currently, only five maps are available for consultation, since the initial overall map has disappeared, and the others are located in different museums and archives. The other maps that covered additional regions, such as one that depicts Venice’s boundaries with Ferrara, are crucial for un-
FIG. 24 Cristoforo Sorte, map of Trevigiano, 1556.
derstanding Sorte’s work method. Salvino Salgaro has conducted extensive research into how Sorte operated, reconstructing his methods from sketches, documents, and maps; he then compares these to documented operational practices of the time, since Sorte left no specific written documentation on the adopted method. Salgaro understands the creation of a map across two phases: first, the survey conducted directly at a site, and second, the input of this data on paper. (FIG.24 and 24a)

However, in addition to providing a detailed description of Sorte’s surveyance methods and techniques, Salgaro emphasises how the first phase is based equally on direct experience of places. As described in the previous chapter investigating Sabbadino’s approach, this type of knowledge could not be so simply produced by the work of a tool or machine, since it was built up through the accumulation and transmission of generational knowledge, and exchange amongst experts who, most importantly, worked from the careful observation of sites. Similarly, Sorte draws upon his own in-depth knowledge of the territory, enabling him to understand the state of the visited landscape and the hydraulic and geological layout of the land. There are two books, published in different stages of his life, that most demonstrate his deep interest in this issue: *Trattato dell’origine dei fiumi*, written around 1560, and *Modi di irrigare la campagna di Verona*, written between 1560-1593. These are not systematic and structured treatises, but rather a collection of theoretical and practical observations, letters, documents, and requests
FIG. 24a Cristoforo Sorte, map of Verona, 1556.
made to the Republic of Venice. Nevertheless, Sorte’s work reveals his eclectic personality, dedicated both to the search for the philosophical origins of rivers, as expressed in his first book, and to the practical improvement of the hydrology and soils of Verona’s countryside, as addressed in the second.

In particular, Modi di irrigare la Campagna di Verona provides a further record of various issues relating to Venice and its territories in that specific historical period. According to Maria Simonetta Tisato, Sorte was not only a witness to one of the most impressive and transformative land reclamation projects, but also a person responsible for dealing directly with the first conflicts that arose in the areas of the mountains in response to the new management of political territories and the enclosure of collective areas.112

In addition to his personal experiences, Salgaro indicates that Sorte collected further information from local communities, or “huomeni practici dei luoghi,” who often provided insight into historical records. With the same approach used to control the state of health of the lagoon by interviewing the local fishermen, Venetian institutions used this type of informal acquaintance as a further source of information to aid their decision-making processes.113

After Sorte had gathered a large amount of data, including survey results and sketches as well as other formal and informal records, he was able to proceed to the second phase of his study and begin setting out his maps. When compared to other maps, two factors in particular make his mapwork extremely peculiar. Firstly, he employs a double technique,
combining accurate zenith and pictorial perspective views. While the first views were based on collected data, the second views emphasised their unity and aimed at summarising their vibrant topographical structure. Rather than showing the entire landscape with a few symbols, precious details that were previously overlooked, or just generically described, are enhanced. Despite being out of scale and not faithfully reproduced, mountainous reliefs contribute to restoring the spatial relationships and perceptual textures of the landscape, rather than merely mapping its geometry.

In addition to the drawn outlines, Sorte developed a technique for applying colour to the maps. In 1580, he describes this technique in his last pamphlet, Osservazioni nella pittura. Unlike Alberti’s De Pictura and its structure, Sorte’s pamphlet does not purport to be a systematic work with a theoretical aim. His explanation has a practical and didactic purpose, particularly in terms of mixing colours, brush types, and strokes, with the sense that “whoever has good drafting skills and perfect understanding of drawing will do everything easily with the hand that with the pen cannot be taught.” The tone and purpose of the pamphlet is established from the outset; Cavalier Vitali had written to Sorte, asking for further explanation regarding the cartographic work he had received as a gift. Vitali specifically requested clarification on not only Sorte’s technique, but also an explanation of how this came to capture the essence of rivers and other natural elements so successfully. In response, Sorte began his text by describing the origin of rivers, a subject he had already investigated.
and described. Although the discourse here seems to diverge from his main point, this further illustrates how Sorte intended for cartography to be integrated within a broader body of knowledge, developed through interdisciplinary studies, such as hydrography and philosophy, for situating the physical and affective aspects of specific sites.

An interdisciplinary approach to knowledge production, as already mentioned by Sabbadino and Aleotti, is encapsulated here, by Sorte, in visual form. As a result, he makes his readers aware from the outset that his text will not discuss the art of painting, but will rather explore this practice from the perspective of cartography. Following this introduction, the text focuses on the art of using colours - whether on paper, canvas, walls, or for oil painting on wooden panels – instead of covering every aspect of painting. Sorte proceeds to discuss the technique used for watercolour. At the time, it was uncommon for debates on painting to focus on colour, and even more unusual to begin an investigation considering the technique of watercolour, since these were marginal and rarely referred to topics in most treatises. Sorte’s choice is, no doubt, influenced by the extensive use of colour in his maps, which comes to represent his observations of the diversity of nature. Landscapes’ colours cannot be defined by only one green or one blue, and so for this reason Sorte claims:

“I used three types of greens, two with a water base and the other with juice, which as time goes on becomes thick like a paste: with one I painted the plains of the land and the hills in the fertile places; with the other I colored in the sterile places; and with the other, that of the juice, I used to shade the two above. And so that
Your Excellency may observe better the desire that I have to serve and please him, since I cannot be liberal with the fruits of fortune, not having been granted that, I will at least not be stingy with those things, according to the opportunities that will come in this small discourse, that I have learned through hard work and experience. Therefore, Your Excellence will next know the way in which to compose the above-mentioned waters, which is this.”

Sorte creates an efficient and beautiful way of applying colour to his maps. On the one hand, this technique was efficient because it anticipated the abstract symbolic correspondence of natural elements and colours that would dominate later mapwork. On the other hand, there is a stated commitment to conveying the vitality of nature and its elements. This concept of vibrant matter is defined in Sorte’s explanation of the process of painting a landscape onto a wall. The painter includes accents that explore “not only the present things seen by him, but also things from centuries ago, whether they be true or made-up and even better sometimes if they are not described in writing, almost lifelike, and lively and just shy of breathing, should they be seen represented judiciously with the brush.”

After explaining the techniques of oil painting and observing the painting of *Pala di San Giorgio* in Verona by Paolo Caliara, Sorte highlights the importance of drawing principles and, in particular, those that concern perspective. According to Moshe Barasch and other scholars, this unusual choice was influenced by the fact that “contrary to the Florentine theory of art, design is here conceived as a secondary method of representation whereas colour is the principal
means of imitating nature.” As a pictorial tool, both perspective view and colour also contributes to the interpretive aspect of mapping.

As a result of the combination of objectivity and “naturalism,” Sorte’s work possesses a sense of ambivalence, which echoes Baratta’s definition of “eloquent maps.” On the one hand, many scholars acknowledge the peculiarity of Sorte’s work as a result of this ambivalence. However, they remain divided on the nature of his uniqueness, questioning his specific conceptions of and concerns for the landscape. According to Schultz, from a painterly point of view, Sorte’s naturalism was strongly influenced by Flemish painters, such as Joachim Patenier and Hieronymus Bosch, who began recording landscapes from life in “informal landscape drawings.” However, this observation does not help to further define the specific type of naturalism which Sorte embodied. A question arises of whether he was at all influenced by Venetian culture, or whether this work borrowed entirely from Flemish painting, which was developing a form of the subjectivization of nature.

Art historians agree on the fact that the term landscape was coined in Venice in the 16th century, and the theoretical basis for painting was provided in Alberti and Leonardo da Vinci’s works, as well as further developed by Giorgione and Titian, who created landscape paintings as a unique form of representation in which nature played a central role. However, it should be noted that this consensus does not imply a homogeneity of perspectives regarding landscape painting at
the time. For instance, the Venetian writer and painter Paolo Pino identified a difference between Flemish (Northerners) painters and Venetian painters:

“The Northerners shows a special gift for painting landscapes because they portray the scenery of their own homeland, which offers most suitable motifs by virtue of its wildness, while we Italians live in the garden of the world, which is more delightful to behold in reality than in a painting.” 125

However, Sorte’s naturalism also differed significantly from the idealism of Titian’s landscapes, which were painted in the studio without being in contact with nature. For instance, within his text, Sorte’s description of the four seasons is used to explain the diversity of nature. Significantly, this is reminiscent of the Arcadian discourse. Sorte exceeds the usual image of plants and flowers in the springtime, which is a common theme in the Arcadian literary tradition, instead emphasising the variations of colours, “different greens,” and brightness. His aim is to communicate the peculiarity of the Venetian landscape and its atmosphere, including its inhabitants, history, culture, beliefs, and relationship with nature as a whole.126 Therefore, through incorporating the Flemish techniques within Italian painting tradition and theory, Sorte contributed to the development of a singular approach for describing landscape at the time.

Additionally, Sorte’s uniqueness comes from a philosophical and spiritual approach, based on the revision of the legacies of Plato, Aristotle, and Epicurus, which had greatly occupied the leading humanists in the previous century. De-
nis Cosgrove defines this concept of landscape as an expression of a “religion of the world.” According to Cosgrove, this concept was based on Neoplatonic thought and Hermetic symbolism. These traditions perfectly suited Sorte’s taste for both numbers and geometry, seen as the supreme law of the universe, as well as an understanding of the essential harmonious relationship between humans and their environment: “men in communion with nature.” In the analysis of Osservazioni nella Pittura, two paragraphs clearly illustrate Sorte’s religious approach. As he explains, nature is a model to be admired as a “mother of all things and at work with the continuous spinning of the skies.” Several paragraphs later, he describes the world, embodied by the Father God as an “invisible omnipotent essence, intangible and incomprehensible,” which was influenced by Christian interpretations of Plato.

However, the nature of Sorte’s uniqueness still remains unclear. Barasch agrees with Schultz’s statement regarding the innovative nature of Sorte’s maps. Nevertheless, he first attributes this to the “the inner vision of the artist (which) has now become the main source of the work of art.” The landscapes that Sorte depicts through his maps, the colours he uses, and the naturalness of their features, are all attributed to a free and inventive mind, which identifies him as “the forerunner of modern subjective aesthetic.” Barasch’s sense is confirmed by Salgaro, who asserts that Sorte “presents a qualitative poignancy hardly found in the following centuries, when the cartographer, becoming increasingly technologized, tends to depersonalize his works.” There is, however, a dis-
crepancy between the two statements. Salgaro’s conclusion comes to emphasise the opposite; Sorte’s naturalism was singular, since it is framed within a single historical period. In this regard, he cannot be seen as a forerunner because his technique was practically supplanted by increased objectivity in cartography. This discrepancy exists because Sorte’s work cannot only be interpreted in terms of his abilities as a painter or cartographer.

Instead, Sorte’s naturalism can be interpreted in a third way, revolving around his figure as a hydraulics expert, and as Savio delle Acque, who actively engaged in Venetian life as well as the historical and environmental conditions of the city and its territory at the time. Without taking into account this aspect, any consideration of his naturalistic approach is reductive.

A recent study by James Pilgrim supports the hypothesis that Sorte’s work offers a unique source of interest:

“Destabilizing the distinction between subject and setting implicit in period thinking about art (a distinction necessary for the emergence of the modern “independent” genre of landscape painting), the Osservazioni instead recognizes that society cannot be divorced from its ecology, that the two are inextricably intertwined. The modernity Barasch discerned in Sorte’s contrarian text might therefore be said to lie in its theorization of a kind of landscape painting marked not by the emancipation of setting from subject but by an acknowledgement of their ultimate inseparability. With its foundation in practices and ideas relating to the highly fraught process of environmental exploitation on the Venetian mainland, the Osservazioni complicates the tendency to see the emergence of an Italian landscape tradition as either a purely theoretical development or an epiphenomenon of the pastoral tradition in literature.” 

133
By highlighting how the peculiar maps depicted by Sorte embody the inseparability between the subject and the object, Pilgrim suggests reflecting on the different levels of understanding they incorporate: the material and physical level based on visual information; the political level, since, through his investigations, Sorte collected the voices of those did not have. His pictorial sensitivity, which functions as poetry, adds a symbolic layer to his work, revealing the intangible side of objects.\textsuperscript{134}

Moreover, Pilgrim’s observation of the Italian pastoral tradition could be amended in light of the multiple nuances of landscapes illustrated by Ruzante’s perspective,

In conclusion, Sorte represents a great example of how the Arcadian discourse conjugates within the visual arts. By reassembling the elements of which reality is composed in an unprecedented form, he could also be considered a fore-runner, but not of modern cartography as outlined by Barasch, but instead of a more critical and contemporary impetus that attempts to “reset modernity.” \textsuperscript{135}

On the contrary, Aleotti’s study of cartography confirms Salgaro’s argument, that Sorte’s peculiar pictoriality was gradually replaced by an objective and depersonalized approach.

The fourth book of Aleotti’s treatise embraces the art of mapping scientifically and technically the most, without leaving any room for pictorial features or poetics shades which, on the contrary, characterize other parts of his treatise.
FIG. 25 Giovan Battista Aleotti, drawing of a method for mapping the sinuous contours of a stretch of river at different scales, 1600.
FIG. 26 Giovan Battista Aleotti, map of the State of Ferrara, 1603.
Using Venice as a case study, Aleotti recommends a procedure that involves site visits, surveys, reports, and drawings, which would include precise maps. Techniques for measurement, ways of drawing the maps of towns and the correct outline of riverbanks, and design reclamation activities become the only subjects that Aleotti addresses. Here, his purpose is extremely didactic and useful for advancing surveyance activities, despite the general polyhedral nature of his treatise. ¹³⁶ (FIG. 25, 26) Therefore, Aleotti’s maps establish a tendency that eventually came to constitute modern cartography.¹³⁷

5.8 The Italian naturalistic hydraulics school.

Castelli’s contributions suggested a trajectory of scientific progress that influenced the evolution of subsequent theoretical investigations, which improved water regulation, practices, and technological innovation in the hydraulic discipline. According to Di Fidio and Gandolfi, Italian hydraulic theories continued to seem ground-breaking for at least the next two centuries; this was thanks to productive knowledge exchange among scientists in other cities; Bologna, Florence, Rome, and other countries outside the Italian peninsula, such as France and the Netherlands.¹³⁸

Beyond Venice, the instability of river water across Italy has kept the debate between mathematicians, engineers,
and governors active over the centuries, with a focus on specific issues, such as the diversion of the Reno. The frequent flooding of the Arno has also remained a prescient issue ever since Leonardo da Vinci initially grappled with this case, whilst additional attention focused on the Tiber has seen no resolution over the years to its regular overflowing. Therefore, the development of methods to prevent the erosion of river-banks and the diversion of rivers has been constantly pursued.

A historical change in the development of these studies began in the 19th century, when the French hydraulic school, which was entirely centred on mathematical aspects, came to prevail culturally over the Italian one. However, according to Giulio De Marchi,139 “in addition to hydraulics, which is mathematics but which we prefer to refer to as physics, there is also natural hydraulics, which applies its techniques and is almost entirely dependent on observation and experience. Instead of the logical attitudes that distinguish mathematicians, the second necessitates intuition, which is a trait of naturalists and physicians.”140

The most relevant element of this Italian approach was the idea that any solution required in-depth investigation into the state of the health of rivers and their idiosyncratic features. Consequently, a few empirical and informal practices, which belonged to collective memory deeply rooted in local communities, continued to be discussed in treatises as a relevant part of hydraulic science. Among these, Trattato della direzione de’ fiumi, written in 1664 by Fabiano Michelinì,141 investigates various theories and methods used in the
protection of riverbanks from erosion, such as paradori, pali, pennelli, and pignoni, which were preferred to the rigid and orthogonal reinforcements of the banks along with forced diversions. Along with Michelini, other scholar can be cited, such as Giovanni Battista Barattieri, an Italian engineer, who wrote Architettura delle acque in 1669, which beautifully illustrates the corrosion along rivers.

However, above all, the contribution of Domenico Guglielmini, a doctor, chemist, and hydraulic engineer, appears crucial. From the works of Barattieri and Michelini, Guglielmini moves towards a more detailed investigation of rivers and an understanding of the movement of water through them, based on inherited medical-naturalist traditions. In one of his most significant works, Della natura dei Fiumi, a mathematical and physical treatise written in 1739, he defines rivers as a body of water, applying the metaphor of the human body’s circulatory system of blood, as already applied by Sabbadino and Aleotti.

Contrary to what one might think, the application of this naturalistic metaphor, which had its roots in the tradition of 15th-16th century Italian hydraulic studies, did not hinder the effectiveness of scientific investigations. This metaphorical relation represented is key for defining both innovative physical-mathematical principles and practical interventions to protect rivers. At the time, discussions regarding the diversion of the Reno were still ongoing, responding to flooding in Bologna and Ferrara’s countryside. Although the phenomenon was well-known, no definitive solutions were found since
local governors debated two opposite perspectives, which necessitated different diversion projects; Bologna argued for the diversion of the Reno directly into the Po Grande, contending that this intervention most respected the natural topography of the territory. However, this solution would have caused considerable damage to Ferrara, since the maximum slope of the water pointed directly at the city, which had long since defended itself against flooding by building riverbanks, which resembled more walls. Having already renounced the navigability of the proposed secondary branch of the Po, Ferrara instead proposed the divergence of the river on the east side, towards the sea, which favoured its commercial trade routes.

This debate illustrates how territorial transformations and decisions were not purely based on scientific fact but were rather informed by a variety of factors, including political, economic, and social concerns. Bologna became the champion of a perspective that promoted the principles of nature only for its own strategic, political, and economic advantages. Ferrara couldn’t help but oppose it, evoking, on the contrary, the value of applying art over nature when it was necessary to protect its citizens and territories.

The proposed solution by Guglielmini mediates between a scientific understanding of the movement of water and an accurate study of local conditions, taking into consideration the course of water, its dimensions, the orography of the ground, and the density of sand within it. As stated by Maffioli, Guglielmini’s medical perspective, which considered the river as a living organism, or more specifically as
a human body, was essential to the investigation of the effects of its “illness” concerning its internal causes, such as its morphology, as well as external circumstances, which could be correlated with human intervention, thus complicating the understanding of water motions and its management.\textsuperscript{145}

Just as a good doctor who cares for their patients’ needs with the primary objective of protecting their health, the care for the management of waters would be based on the adoption of artistic principles consistent with the nature of the river and its features. By recognizing the art of water management from a holistic and medical perspective, the philosophical debate regarding nature’s perfecting through art, already encountered by investigating machines, was resolved without fracture between the human and natural realm.\textsuperscript{146}

It is inevitable that one may think about how this approach recalls Alberti’s concept of which architecture was the good medicine for society, including the art of water management as part of it. To keep society and its environment cohesive, both work as effective medicines.\textsuperscript{147}

In addition to Guglielmini’s work, other minor authors of the time also provided important contributions. Among these, Vincenzo Viviani, an Italian mathematician and engineer, wrote two discourses in 1688, with one intended to protect Florence from the Arno’s floodings, Discorso intorno al difendersi da’ riempimenti e dalle corrosioni de’ fiumi, applicato ad Arno in vicinanza della Città di Firenze, and a second, Discorso intorno al difendersi da’ riempimenti e dalle corrosioni de’ fiumi.-Relazione intorno al riparare la città e
campagne di Pisa dalle inondazioni, which focused on the same subject but with Pisa’s countryside as a case-study.¹⁴⁸

These texts are relevant as they demonstrate Viviani’s intuitive and empirical approach from the outset, developed from more than just theoretical work. The book was addressed to Cosimo III, the Duke of Florence, who requested suggestions for protecting Florence and its surroundings from the increasing expansion of the Arno. On the one hand, Viviani realised that the rising water level was already a phenomenon present in the city. Through archaeological findings, he reconstructed how the city was changed over time for this reason: ancient floors and architectural ornaments located at different heights on buildings and blocked-up windows.

On the other hand, the rapid increase in the water levels of the Arno was unnatural; therefore, Viviani claimed this could be partially due to the morphology of the river, since the rise in water levels affected the surrounding countryside even before it reached Florence.

By widening the investigation’s area, he determined that the primary cause of this rapid increase in the flooding phenomenon in Florence was human-caused deforestation in the surrounding mountainous regions. Deforestation left lands bare and unable to hold back floods, which violently swept through the valleys, carrying stone and other waste materials downstream.

“Another acting cause from the parts above, which has become, and will become more and more sensitive, through a significant deforestation, which in universal, against the ancient regulations,
was made of the Alps and of the mountains, in particular those that irrigate the course of the Arno from Incisa to Rovezzano and the many cultivated crops along the path mostly ordered by the foot of the mountains themselves to the peaks, and in the depth of the valleys; where, through the passage of the rain, ditches, channels and rivers take shape and descend to the Arno. Those are the most evident causes contributing to the river’s fullness; since the rains, falling on those cultivated and moved mountains without trees and no longer finding the restraint of the bushes and of the wood, flow precipitously and are accompanied by the material of the soil, false, and gravel of which they are formed, and lead furiously into the river, which, having become far larger than it would without them, carries them downwards as much as the force of the current can push them forward, abandoning the heaviest parts along the way, those that from point to point overcome with their own descending movement the violence of the progressive impetus consented to them, and this in measure to the size and the duration of the floods.”

According to Viviani, in order to prevent flooding, firstly, locks would need to be constructed along the tributaries of the Arno to slow their flow. Secondly, he suggested replanting their banks with olive trees. However, he stressed that this process should not be hurried out of greed for acquiring new pastures. Rather, it would be necessary to wait for trees to grow naturally to form compact soil that can withstand floods and retain water.

The idea that human greed is primarily responsible for environmental instability was not an original argument. Alberti has already theorized it in Theogenius: Sabbadino used it to describe one of three enemies of the lagoon of Venice, and Aleotti used it to build his accusation against Bologna’s government. Therefore, like his predecessors, Viviani could only confirm the connection between the inner nature of hu-
man beings and the negative impacts on the environment.\textsuperscript{151}

Additionally, it is remarkable to note how ethical arguments were still joined with technical observations in hydraulic treaties, as if they were intrinsically linked.

Benefits resulting from this strategy would not just protect the city of Florence and its citizens from flooding, but also landowners would see greater results from their crop harvest in the long run: “they would enjoy the goods of those valleys, consolidated and secure from landslides. they would enjoy the goods flowers and fruits from plants, and in due time, oil from the olive groves, timber, and livestock of all sorts and in greater numbers of pastures.”\textsuperscript{152}

However, Viviani presented another argument that transcended the political and economic dimension, introducing an aspect often overlooked in territorial management policy: the aesthetic outcomes of care.

In attempting to demonstrate how the proposed practices would benefit community members and private interests, he asserted that these would provide material and economic safety for citizens, but also aesthetic enrichment. According to Viviani, through riversides’ restoration and adjacent areas, the forgotten \textit{amoenus loci} would regain their aesthetics as a result of communal commitments. And vice-versa, these practices would strengthen the intangible ties between human beings and their natural environment.

To conclude his argument, he invited one to apply this perspective by transcending political boundaries, as well as temporal ones, embracing the destiny of future generations:
FIG. 27 Bernardino Zendrini, picture of a page of Leggi e fenomeni, regolazioni ed usi delle acque correnti, 1741.
Delle acque correnti. 247

... uniti. Ora si deve notare che la detta parabola non possa cominciare nelle acque... ma sotto di quella ad un fetto della lana... Vo.

IV. Qual forma delle equazioni da ancora la prima del... o...; dividendo la curva una linea retta farà... Parimenti $\frac{dy}{dx} = n$, ovvero $dx = \frac{dy}{n}$, onde...

$\frac{x^2}{2} dy = \frac{dy}{2} \int \frac{xdy}{y} = \frac{x^2}{2} dy = \frac{dy}{y} \int \frac{xdy}{y}$; ma $x = \frac{y}{b}$...

$\frac{x^2}{2} dy = \frac{dy}{y} \int \frac{xdy}{y}$; ovvero $\frac{x^2}{2} = \frac{y}{b}$ come in detta numero primo.

V. Trovarsi il gravame, che riflette un argine, la di cui... orizzontale un angolo di gradi 40, cioè l'angolo AEB. Fig. 9...

... di y = b per tre differenti posizioni, ed dividere... la faccia dell'argine BE, che li figgono di piedi 50 parti; onde il primo valore di y dopo AB di piedi 50, e il secondo valore facendo $BE = 50$, farà piedi 19; il terzo piedi 13; ed i suoi rispettivi nella formula...

$\frac{y}{b}$ dannorepetitivamente 475; 188; 168; 78; 17; ponendo $y = ad$ ad un piede, dimostrato questi numeri rag-... tanti piedi cubi d'acqua, che aggravano rispettiva-...
“there is no expenditure the most plausible, nor the most grateful, though very great, then that which is for the benefit of the next generations.”

Whilst Viviani did not provide any drawings in his text, those contained within the book, *Pensieri sul governo de’ fiumi*, written in 1782 by Conte Carlo Bettoni, made up for this lack. Unlike previous authors, Bettoni was an agricultural reformer who, in order to secure his lands, developed an interest in protecting riverbanks.

Beyond his words, the most fascinating aspect of his text consisted of a series of explanatory boards of various processes, drawn to illustrate the repair of eroded riverbanks using local plants and as a result of long tests and experiments. Bettoni described which plants were most appropriate, along with different methods for intertwining their branches so that they could grow deeply rooted in the soil and compact it. (FIG. 28-33)

Despite this brief description, it is evident that the Italian naturalistic hydraulic school has contributed to defining a singular trajectory in which theory and practice were united. Here, local materials, techniques, and knowledge were preserved and, above all, the principle that they were effective when understood as acts of care for the natural environment, which were historically rooted in civic practice.

This connection still highlights how ecological issues require a collective dimension, which, going beyond the scientific and technical solutions, embraces ethical and social concerns. As already said, these contributions slowly
were expelled from that hydraulic discipline and its written scientific production. Just looking at Bernardino Zendrini’s text, *Leggi e fenomeni, regolazioni ed usi delle acque correnti*, published in 1741, visually leaves one overwhelmed by mathematical calculations and diagram geometric and theorems.¹⁵⁵ (FIG. 27)
FIG. 28-33 Carlo Bettoni, drawings on the experiments to protect the riverbanks by the use of vegetation, 1782.
Endnotes

1 Alexandre Koyré was a historian of science who lived from 1892 to 1964. He made an invaluable contribution to the studies of Galileo and Descartes. His text, *From the Closed World to the Infinite Universe*, offers a clear explanation of the evolution of scientific thought as a whole, as well as the effect this had on other disciplines. Alexandre Koyré, *From the closed world to the infinite universe* (London: The John Hopkins University, 1957).


3 See introduction.

4 Both of them were involved in a debate regarding the Brenta’s diversion. Upon Alessio Ajardi’s appointment as responsible for the works in 1488, Fra Giocondo opposed this decision. He argued that the diversion would not take advantage of the naturally slow movement of the waters. Sabbadino also attributed a lack of knowledge of the lagoon area to Ajardi, without directly mentioning him, which could not be compared to the Lombard water-and-canal system which Ajardi was instead an expert on.

5 Italian mathematician and physicist who lived between 1578 and 1643.

6 The treatise was published in 1628.

7 The Pontine swamps are located 130 kilometers from Rome in the southern part of Lazio. The region, known at the time as Campagna and Marittima, is geographically defined by a mountain range (Monti Lepini and Ausoni) on its southeast side and by the Tirreno coastline on its west side. It is bordered by Colli Albani on the northern side and by the Circeo promontory and the Terracina Gulf on the southwestern side. Natural borders define an area of 50 km in length and 20 km in width. A large portion of its land is situated below sea level, while other areas are located 30 or 50 meters above. Its soil is composed of fluvial-lacustrine peatland, marine clays, and sandy and silt deposits, all of which reveal a marine depositional origin that has been transformed into a transitional coastal environment, followed by a continental fluvial-lacustrine system. As a result of its natural configuration, rivers have obstructed their flow to the sea, contributing to the area’s status as extensive swampland. The present landscape was created as a result of long-lasting human transformations, which began with the Etruscans and Romans. After the Romans,
beginning in the 15th century, numerous Popes tried to reclaim these lands with a series of partial successes and failures. However, the land remained more or less swampy for many centuries until the area’s reclamation in the early 20th century. For a general understanding of the historical events involving the Pontine, see Valentino Orsolini Cencelli, *Pianure Pontine, nella preistoria, nel mito, nella leggenda, nella storia, nella letteratura, nell’arte e nella scienza*, (Bergamo: Opera Nazionale per i Combattenti, 1934).

8 In his essay, *Roma instaurata*, Tafuri explains how Leone X’s determination to reclaim the Pontine swamps may have been a direct consequence of Giulio II’s view of Rome and his ideas for enhancing the Pope’s authority. In fact, Giulio II was involved in several urban projects, which led to him being heavily criticized by theologians such as Erasmus of Rotterdam, who had started to emphasise the contradiction between the growing enrichment of the Roman church and the evangelical perspective. As a result of these criticisms, Leone X, Giulio II’s successor, decided to cooperate with those who criticised the ecclesiastical apparatus. He implemented a different cultural strategy, embracing Erasmus’s concept of the Christian Prince and his educational project, described in the *Institutio Principis Christiani*. According to Erasmus, among the social and political responsibilities of princes and politicians, are the maintenance of unsafe places, public buildings, bridges, riverbanks, aqueducts, agricultural fields, and the reclamation of swampy areas. Erasmus thought that those actions should have represented the irreproachable conduct of princes and their care of citizens, serving as a model of civic virtue. Manfredo Tafuri, “Roma instaurata”, in Christoph Luitpold Frommel, Stefano Ray, and Manfredo Tafuri, *Raffaello Architetto* (Milan: Electa Edizione, 1984), 59-107. However, centralizing the political power of the Pope to restore the confidence in the spiritual authority of the Catholic Church was a strategy that did not begin with Leone X. In the years after Martino V returned to Rome in 1420, the main objective was to recoup previous political power and establish a self-governing state. It included systematic interference in institutions such as the *Magistri edificiorum Urbis and viarum, Congregazione delle acque*, devoted to road and water management; local administrative and political apparatuses were designed to encourage city development by the construction and maintenance of open spaces, infrastructures (roads, bridges, aqueducts), and collective buildings (churches, clerical palaces, archives), but also to attract the most talented artists, architects, and writers. As a result, secular institutions gradually came under the influence of the Church and its apparatus. For a general understanding of these historical events, see Mario Caravale, Alberto Caracciolo, Storia d’Italia. Lo Stato Pontificio da Martino V a Pio IX (Vol. 14), Turin: Utet, 1978. For a better understanding of the relationship between the church and the construction of the modern state, refer

The most recent research on the relationship between Pianure Pontine’s reclamation projects and the Pope can be found in the History Ph.D. thesis written by Irene Bevilacqua, I papi e le acque, politiche del territorio nelle paludi pontine tra XVI-XVIII secolo, Università degli Studi di Pisa.

9 The book Del Moto e Della Misura Delle acque was published in 1630 by Francesco Arconati, who collected Leonardo’s notes and texts on this subject. The book consists of nine chapters on water and related topics. The collection has been published in Leonardo da Vinci, Del moto e misura dell’acqua, ed. Enrico Carusi ed Antonio Favaro (Bologna: Zanichelli editori, 2018).

Between the first and fifth chapter, Leonardo provides an extensive description of water as a physical element, discussing the reason for its shape, its weight, and its movements concerning external conditions. In the following chapters, Leonardo discusses the damage caused by water, exploring the rivers’ shape, depth, and length. He expands on how water-borne objects contribute to natural barriers by causing overflooding and raising the levels of riverbeds and the sea at river mouths. To develop an accurate and extensive list of case studies, Leonardo researched the relationships between the flow of water and types of objects. The ninth book discusses the use of mills and hydraulic machines to move water upwards at different levels, in order to create an endless flow of water, clean and dig canals, and construct foundations.

11 Ibid., 1.
12 “Difficult I say, for the truth is, these knowledges, though of things next our senses, are sometimes more abstruse and hidden, the knowledge of things more remote; and much better, and with greater exquisiteness are known the motions of Planets, and periods of the starts, than those of Rivers and Sea.”
13 Ibid., 2.
14 The law of uniform motion was not defined until the end of the 18th
century, being integrated with correct coefficients up until the middle of the 19th century.

15 Castelli, *Discourse of the Mensuration of Running Waters*, 3.
16 Ibid., 37.
17 To indicate the direction of the argument, I suggest that, while the Enlightenment profited largely from the disposition of a very powerful descriptive tool, that matters of fact were excellent for debunking quite a lot of beliefs, powers, and illusions, it also found itself totally disarmed once matters of fact were eaten up by the same debunking impetus.

18 Castelli uses this expression for the process of landfill, where the muddy channel bed merges with shallow water.

Castelli, *Discourse of the Mensuration of Running Waters*, 64.
20 Frà Giocondo was the only individual to express a negative opinion, claiming that the hydraulic slope would be reduced, and the intervention would not be beneficial.
22 Castelli’s statements provided a description of fluid dynamics and its main concepts, such as the rate of flowing water. Numerous instruments have been invented to measure the speed of water since the foundation of hydraulic science. For centuries, hydraulic tachometers made it possible to estimate the flow rate of rivers and canals more reliably than theoretical formulas. Leonardo invented a rod apparatus that allowed him to explore the differences in speed between the surface layer and beneath. However, the first “hydrometric rod” was invented by Nicola Cabeo at the end of the 16th century.

The relationship between water velocity and the length, width, and depth of the river had been completely ignored previously, with its volume being otherwise calculated on the basis of a static solid.

24 “I did in full College represent my thoughts touching the state of the lake of Venice; for there not being such wanting, who without so much as vouchsafing to understand me, but having only had an inkling, and bad apprehension of my opinion, fell furiously upon me, and by violent means both with the Pen and Press, full of Gall, did abuse me in reward of the readiness that I had express to obey and serve them.” Castelli, *On the Mea-
surement of Running Water, 74.
25 Ibid., 64.
26 Ibid., 64.
27 “A thing is, in one sense, an object out there and, in another sense, an issue very much in there, at any rate, a gathering. To use the term, I introduced earlier now more precisely, the same word thing designates matters of fact and matters of concern.” Latour, “Why Has Critique Run out of Steam? From Matters of Fact to Matters of Concern,” 233.
30 “From an epistemological viewpoint, the controversy is relevant as a case of clashing ‘styles of thought as it constituted a disciplinary conflict that pitted Galileian physico-mathematical abstraction (which resulted from the isolation of a set of quantifiable data) against ‘geological’ concreteness (a form of comprehensive knowledge which aimed to cope with systemic complexity).” Ibid., 420.
31 Ibid., 420-422.
32 The Duchy of Ferrara represented a political opponent to the Republic at that time, due to its accession in the Cambrai league.
33 To further investigate the historical events beyond this period, see Michele Bondesan, “L’alveo e il delta,” in Po: AcquAgricolturAmbiente (Bologna: Il Mulino, 1990), 281-435.
34 Ficarolo is a small town close to Ferrara.
35 Cesare Maffioli, La via delle acque (1550–1700): Appropriazione delle arti e trasformazione delle mathematiche (Florence: Leo Olschki, 2010), 29.
36 Cristoforo Sabbadino had already highlighted the negative effect of fishponds on the flow of water. This kind of advice can also be found year later, suggested by other authors.
37 Castelli, Discourse of the Mensuration of Running Waters, 99.
38 Ibid., 98.
39 According to Maffioli, Domenico Guglielmini was the last Italian scholar who tried to study waters’ rivers as a whole system: “The river’s geographical features described by Domenico Guglielmini had lost their unified character, and this led to two major studies: the study of free surface currents and riverbeds. During the nineteenth century and the first decades of the twentieth century, the study of the river was further
sectioned, and its living parts were incorporated into geomorphology and hydrographic dockyards. The rest, so to speak, had dissolved. As a consequence, from then on, the new disciplinary systems and new mathematical and experimental developments left no more room for Domenico Guglielmini’s unitary model. “(Translated by the author). Maffioli, *La via delle acque (1550–1700): Appropriazione delle arti e trasformazione delle matematiche*, 3.

40 Scholars still argue over Leonardo’s contributions. Despite the importance of Leonardo’s work, many believe that Castelli laid the foundations of the discipline.

41 Giovan Battista Aleotti was an Italian architect, an expert in land surveyor and a hydraulic engineer. He lived between 1546 and 1636. The text was written around 1600.

42 The title of Aleotti’s treatise is *Hidrologia overo della scienza et dell’arte di ben governare le acque* (Hydrology: the science and art of the water managment).


44 In particular, his surveys covered lands in the Polesine region of the northwest part of the Duchy, as well as along the Panaro and Secchia rivers in the west.

45 “The multitude of scientific precepts and warnings from the arts that indeed contribute to the perfect regulation of the waters, are scattered in many books by different authors, like geometrical elements were found in the confused writings of Hippocrates, Leontius, Teudius, Hermotimus and Eudoxus (...) I promise to use my utmost diligence to collect and describe them as best as I can. (...) but because this art is subordinate to civil architecture, it must therefore be particularly subject to the precepts of Vitruvius.” (Translated by the author). Aleotti, *Della scienza et dell’arte del ben regolare le acque*, 198.

46 “The architect will learn how to develop the wisdom to not just find any solution but to apply diligent consideration to any issue; in fact, any ill-considered opinions can lead to miserable calamities, both on a personal and a public level. (...) Being tinged overall with a little bit of philosophy brings such virtue and value into the soul of the architect that he will know how to stay away from the detestable miserliness.” (Translated by the author). Ibid.,199.

47 See chapter 2.

48 Alessandra Fiocca states that most of Aleotti’s theories on the motion of water along a sliding slope are derived from Cardano’s teachings. Nevertheless, some of them have been adapted or further developed by Aleotti. Alessandra Fiocca, “Giambattista Aleotti e la scienza e l’arte delle acque,”
Despite being located only 44 kilometers apart, Ferrara and Bologna historically formed two separate governmental entities. Following 150 years of the Duchy of Ferrara dominating the territory, Ferrara was incorporated into the Papal State in 1589, alongside Reggio and Modena. Contrary to this, the municipal institution of Bologna had become a part of the Papal State almost a century before. Despite Ferrara’s annexation, the two cities continued to be antagonistic, exerting opposing political pressure on the Papal State. The diversion of the Reno River in order to facilitate land reclamation was one of the most significant points of tension between the territories. Between Bologna and Ferrara, the Po and its tributaries formed a complex orographic area, whose poor slopes often flooded the countryside, converting it into a vast wetland. Up until the 12th century, the Po had consisted of two streams, including the Po di Ferrara which lapped its main banks.

“The remarkable greatness of the waters therefore is such that it is almost inexplicable, and it is preserved in three places of inestimable immensity: in the bowels of the Earth, above the Earth and up in the skies.”

(Translated by the author). Aleotti, *Della scienza et dell’arte del ben regolare le acque*, 205.

It is interesting to note a similarity, even if extremely simplified, to Athanasius Kircher’s drawings of the water system. He also explored Neoplatonic theories at their utmost, seeking to unravel the mysteries of the world.

51 See sub-chapter 4.2.


53 Moretti describes Aleotti’s narrative style, providing a comparison to Tasso’s works.

54 (Translated by the author). Aleotti, *Della scienza et dell’arte del ben regolare le acque*, 227.

55 (Translated by the author). Ibid., 233-234.

56 (Translated by the author). Ibid., 233.

57 Here, Aleotti refers to Bologna’s administration, which initiated a diversion of the Reno River.

58 (Translated by the author). Aleotti, *Della scienza et dell’arte del ben regolare le acque*, 286.

59 (Translated by the author). Ibid., 288-289.

60 (Translated by the author). Ibid., 308.

61 (Translated by the author). Ibid., 320.

It was not only a metaphor used by the author to enhance his explanation
but, according to C. Maffioli, Tartaglia’s new military science and Galileo’s studies of the science of motion were indirectly related. As a matter of fact, Galileo incorporated an investigation of the motion of bullets into his *Discourses and Mathematical Demonstrations Regarding Two New Sciences* (1638). This prompted Castelli to explore the motion of water further and to define hydraulics scientifically.

62 Alessandra Fiocca, “Giambattista Aleotti. La scienza et l’arte delle acque,” 56-68.

63 Cardano was one of the most important Italian mathematicians who lived between 1501 and 1576. He wrote two influential books, *De Subtilitate Libri* and *De Rerum Varietate Libri*. The latter involved extensive research into the movement of water in canals and rivers.

64 “Two methods of managing water are taken into consideration: expelling or adding water from the area and removing it by evacuating or drying it out.” (Translated by the author). Aleotti, *Della scienza et dell’arte del ben regolare le acque*, 425.

65 Leonardo’s ideas on water and its management are the result of his theoretical, and also practical, interests in this field. He demonstrated a tirelessly inventive mind, supported by the belief that a city should be a healthy place and that this could be achieved through water management. In Vigevano, near Milan, he invented a water system to enhance the “colmata” process. A few years later, he devoted himself to improving Milan’s canal system by constructing new lochs and studying how to divert the Adda into the Arno River. Edmondo Solmi historically demonstrated the relation between Leonardo’s drawing and Leone X’s attempt to reclaim the area.

Unlike his predecessors, Leone X was the first Pope to attempt to reclaim the Pontine swamps. He was driven by the idea of expanding his political power after having tried to reach a sense of agreement between landowners and cities. Leone X (Giovanni di Lorenzo de Medici) belonged to the Medici family and was quite familiar with the potential benefits of a land claim, as had been led by his family in Val di Chiana years ago, alongside Leonardo’s support. After being elected Pope, he decided to continue this same political strategy, beginning with the reclamation of the Pontine swamps and entrusting to Leonardo’s patron. Edmondo Solmi. Within the essay, *Leonardo da Vinci ed I prosciugamento delle Paludi Pontine ai tempi di Leone X*, published in 1911. Solmi discusses Leonardo’s contribution by utilizing multiple sources, namely archival documentation that proves Leonardo’s stay in Rome during Leone X’s Papacy (1513-1521).

66 Aleotti, *Della scienza et dell’arte del ben regolare le acque*, 425.

67 Valli di Comacchio is a wetland area located between Ravenna and Fer-
The eleventh chapter of the eighth book of Vitruvius’ treatise provides the first written evidence of this simple machine, which has remained virtually unchanged through the centuries.

In this regard, Georg Agricola’s *De re metallica* is the most well-known theoretical testimony.

*Aleotti, Della scienza et dell’arte del ben regolare le acque*, 502.


See chapter 2.


Pamela O. Long compares Francesco di Giorgio’s drawings to Leonardo’s ones, explaining similarities and differences: “Francesco di Giorgio and Leonardo both undertook projects of self-conscious authorship on topics of machines, mechanical arts, and machines. For both, visual images played a fundamental role in their authorial practices. In different ways, their writings were connected to engineering practice on the one hand, and to learned practice on the other. (...) the fact that visual images could play such a fundamental role in treatises that aimed to contribute to learned culture, and the fact that machines themselves were embedded in these learned treaties, signals a broad cultural transformation in which mechanical arts and visual images have become newly significant within the larger culture, including the culture of learning.” Pamela O. Long, “Francesco di Giorgio e Leonardo geometry,” in *Picturing machine 1400-1700*, ed. Wolfgang Le-fevre (Cambridge: MIT Press, 2004), 140.

According to scholars today, the text belongs to the Aristotelian school, rather than being written by Aristotle himself.

“The activities with which Daedalus was associated display the breadth and complexity contained within the once synonymous Greek and Latin terms techne and arts, which have parted company in modern English to form the roots for our “technology” on the one hand and “art” on the other. Although it would be wrong to say that the mythical Daedalus was representative of Greek artists in general, ancient divisions of the disciplines did include all manual pursuits under the general rubric of “arts.” Aristotle, for example, viewed painting and sculpture as *technai* along with agriculture, building, medicine, and a host of other pursuits. Poetry too was an art, of course, for it led to a product rather than being an ongoing process of discovery.” William R. Newman, *Promethean ambitions: Alchemy and the Quest to Perfect Nature* (Chicago: University of Chicago Press New edition, 2005), 13.
79 Ibid.,17-20.
81 Newman explains this concept in antiquity, “Underlying these comments is a clear realization of the fact that mechanics is not a perfective art in the Aristotelian sense, since it does not alter or develop the innate elemental qualities of matter, but imposes a new set of properties upon the underlying material one. Wood and iron remain wood and iron even after they have been fashioned into the form of a life like automaton. Like Aristotle’s bed, machines are purely artificial objects and do not share in genuine self-movement such as that which would allow them to propagate their own species. It is this imposition of a new, feigned appearance that allows automata to be classed in the same category of mimetic arts within which the ancient writers customarily placed painting and sculpture. In all three cases, the artifact retains its original material composition and does not “become” the object that it represents, despite appearances. (…) Nature may have been bested, but it had not been replicated.” Newman, *Promethean ambitions: Alchemy and the Quest to Perfect Nature*, 23-24.
82 Ibid.,24.
84 By understanding the difficulties in “mathematizing” water’s movements, we can better appreciate the words of Castelli regarding the lack of a mathematical focus in hydraulic studies compared to astronomy.
85 (Translated by the author). Alexandre Koyré, ” *Du monde de l’à-peu-près*” à l’univers de la précision,” 343-344.
86 Ibid.,347.
90 Three examples/intentions/discourses on how the waters rise from low places.
92 The issue regarding the most effective perspective to represent tools and
machines had been the subject of debate in specific treatises for a long time: “Throughout the sixteenth century the need to have a drawing that was both pictorial and measurable had favored the dissemination of practical, rapid system of “perspective” through which the geometric characteristics of the object represented could be retained unaltered. The drawing proposed by Maggi (1564) is now called military axonometry, retaining a term, which indicates its origin, or at least its predominant usage, in fortified architecture. (...) the first codifier of this method, William Farish, was to call it isonometric perspective (...) This kind of perspective without foreshortening, widespread since antiquity, had throughout the Middle Age the prospective of mathematicians.”


93 (Translated by the author). Ceredi, Tre discorsi sopra il modo il alzare le acque da ‘luoghi bassi, 38-39.

94 He was born in Pesaro in 1545 and died in 1607.


97 Ibid., 346.

98 Alexandre Koyré, From the closed world to the infinite universe, 99-100.

99 See chapter 2.

100 See chapter 2.

101 A formal thread can be traced between Alberti’s map and Tempesta’s, printed from 1593; Alberti’s lines and visual forms find correspondence with the first images of Sisto V’s plan.


104 “ever since Alberti correlated landscape painting with the lowest rung of the social ladder, some Renaissance writers on art fail to mention it as an independent realm of painting, while others treat it as of little moment without the dignity or merit of figure painting or istorie.” Moshe Barasch, “Cristoforo Sorte as a critic of Art,” 254.

105 Roberto Almagià, Scritti geografici (1905-1947). Con elenco crono-
According to Salvatore Ciriacono, this was a crucial aspect of the land reclamation process. He points out that Jacopo Aconcio - an Italian engineer with expertise in military and hydraulic machines who was involved in the reclamation of land along the Thames in 1565 - was one of the first to understand the legal implications of reclaiming land, which would require a “specific regulatory framework” that would safeguard both private assets and common lands from speculation. Salvatore Ciriacono, “Transfer tecnologico, economia e istituzioni nelle bonifiche,” in Arte e scienza nel rinascimento, ed. Alessandra Fiocca, Daniela Lamberdini, and Cesare Maffioli (Venice: Marsilio, 2003), 1-11.


(Translated by the author). Ibid., 9.


See chapter 4.


Salgaro cites an archival document in which the Republic of Venice authorized Sorte to obtain support from “huomeni practici dei luoghi” (people who know places). In Italian, ‘pratico’ means to be familiar with something through direct observation and experience.

The cartography no longer used the perspective, much less the combination with the zenith view.

The reference is to Cristoforo Sabbadino’s maps.


He was a jurist and a man of letters. Scholars have been unable to locate any substantial amount of information, including regarding the nature of the relationship between the two.


Ibid., 32.

Barasch, “Cristoforo Sorte as a critic of Art,” 256.
The term naturalism is use by Schultz. Schultz, “New Maps and Landscape Drawings by Cristoforo Sorte,” 123.

Schultz, “New Maps and Landscape Drawings by Cristoforo Sorte,” 123


As stated by R.C. Cafritz, through the figure of Annibale Carraggi, “The Venetian Pastoral was also subjected to a shit, a Classical Revision,” in Robert C. Cafritz, Lawrence Gowing, David Rosand, *Places of delight: the pastoral landscape*, 83.

He was a writer and painter. His works include *Dialoghi di pittura* (1548), from which this quotation is derived.


“In gracious spring the land is seen covered with beautiful, varied shades of green, decorated with roses and a thousand varieties of flowers, and the new fronds of the trees and every other sort of bush and plant that just hatched from the maternal bark begin to become green. In summer we see in the spacious fields the rolling grass fade as it matures and in some spots the tree leaves yellow or brown and the ground scorched by the heat, as if lacking their vital fluid. Autumn displays another beauty and variety of colors, because we see the leaves turning red and yellow and beginning to fall because of their age. Winter then follows naked, abandoned by all the loveliness of both colors and air, which for most of the time is occupied by fog and rain, and the land with ice and snow, hence horrid that it displays nothing except the bare trees and the land stripped of all its beauties.” James Pilgrim, “On Cristoforo Sorte’s Osservazioni nella pittura,” 29.


Ibid., 268.

“(…) nothing existed of nature, mother of all things and at work with the continuous spinning of the skies” and “nothing else, this eternal Father, if not an invisible omnipotent essence, intangible and incomprehensible, who with only His own being and word created all the heavens, this world, and everything in it and then created the invisible and intangible angel.” Translation from James Pilgrim, “On Cristoforo Sorte’s Osservazioni nella pittura,” 27 and 33.

“Radical change in the concept of art and the canons of artistic production. The established rules which a century before were conceived of as
imparting to art something of mathematical certainty, are now abandoned and their place taken by concepts of the artist’s personality. (...) The inner vision of the artist has now become the main source of the work of art.”
Moshe Barasch, “Cristoforo Sorte as a critic of Art,” 258.

131 Ibid., 258.
132 (Translated by the author). Salvino Salgado, “Knowing places without reading the letters of their names, Cristoforo Sorte, Cartographer,”351.
James Pilgrim even disputes Sorte’s disparaging of the Flemish painters, and provides new evidence from other disciplines, such as the theory of colors developed by Ulisse Aldovrandi.
134 Graham Harman has brought out two crucial aspects in his observations about real objects and real qualities. Harman claims that human beings may not often know the real object and real qualities. They are not knowable and hidden aspects of objects. Opacity is the term used to describe this feature and surprise is how we can indirectly access the hidden aspects. The use of metaphor is an example of this concept as something that mediates the direct image description.
136 In this essay, M.Rossi provides a general overview of Aleotti’s activity as a cartographer.
137 Franco Farinelli, “Prefazione. La Mano sinistra di Kant,” 5-11.
139 De Marchi was a hydraulic engineer and scholar, as well as a professor at the Politecnico of Milan, who published numerous works regarding hydraulics and water motion. (1890-1972)
140 (Translated by the author). Mario Di Fido, Claudio Gandolfi, Idraulica Italiana, 59.
141 Fabiano Michelini was a mathematician, who was born in Rome in 1604, and died in Florence in 1665.
Fabiano Michelini, Trattato della direzione de’fiumi (Florence: Stamperia della Stella, 1664). Digital source:
https://echo.mpiwg-berlin.mpg.de/ECHOdocuView?url=/permanent/library/NH6TEAGB/pageimg&pn=7&mode=imagepath
142 Techniques to protect riverbanks could be divided into two strategies:
passive tools that sat parallel to the banks, or active technologies, which were barriers made up of various materials, such wood ad masonry, placed transversely to the current in order to slow it down.

143 Giovanni Battista Barattieri was born in Piacenza in 1601 and died there in 1671.
146 See in this chapter endnote 81.
147 See chapter 2, endnote 72.
148 Viviani was born in Florence in 1622 and died there in 1703.
150 “Due to their desire to have everything in a short period of time, they have lost everything.” (Translated by Author) Ibid., 34.
151 See chapter 2 and 4.
152 (Translated by the author). Ibid., 36.
153 (Translated by the author). Ibid., 37.
Conclusion.
Epilogue.

London, August 2022, the Architectural Association School of Architecture, Summer School has just ended. I return to my desk to investigate a few aspects of the last chapter further, since relevant connections and thoughts have emerged while exploring the Chiswick Island and the River Thames.¹ (FIG.1)

More so than the rivers flowing into the Mediterranean Sea, the Thames seems to be a living organism. It breathes in and out twice daily with the rise and fall of the tide; its body has changed and aged due to riverbank reclamation, the building of paths, the modification of its meanders, and the artificial diversions that have resulted from human activity over the centuries. The water, vegetation, animals that inhabit the area, and surrounding landscape, amassing a constellation of 180 islands, continues to change. Several of these islands have disappeared and become part of the riverbank and the city, which still bear their geological memory in the names of certain streets and regions, such as Thorney Street in Westminster (Island of Thorns), Bermondsey and Canvey Island in Essex.² Other islands survive despite increasing erosion and other factors relating to climate change; the English language has forged a specific name for them - eyot or ait - to distinguish their unique nature. These eyots are typically made of sediment settled in the water and are characterized by a long and narrow shape, which slowly emerge as small
FIG. 1 Chiswick Eyot. View from the riverbank of the Chiswick Eyot during low tide. Picture by Chiara Toscani.
surfaces moulded by the flow of the river. These islands represent an ecological microsystem with a unique story to tell.

Situated in the densely populated metropolitan area of the London borough of Hammersmith, Chiswick Eyot is part of the council’s natural reserves, which make it an ideal site to observe conflicts and opportunities between human beings and nature from an ecological perspective. Chiswick Eyot was once part of an ecclesiastical parish and was known for its lush vegetation and the abundance of fish in its surrounding waters. Charles John Cornish (1858-1906), a British naturalist famous for his studies of the environment around the Thames, confirms this assertion in his book, *The Naturalist on the Thames*. The work provides a historical picture of the island’s landscape dating back to 1902 when the book was published:

“It has been said that Thames eyots always seem to have been put in place by a landscape gardener. Chiswick Eyot is no exception to the rule. It covers nearly four acres of ground, and lies like a long ship, parallel with the ancient terrace of Chiswick Mall, from which it is separated by a deep, narrow stream, haunted by river-birds, and once a famous fishery. A salmon, perhaps the last, was caught between the eyot and Putney in 1812, though the rent of the fishery used to be paid in salmon, when it was worked by the good Cavalier merchant, Sir Nicholas Crispe. (…) Flowers abound on the eyot. (…) There are those who believe that with the increased purification of the Thames, the next generation may perhaps throw a salmon-fly from Chiswick Eyot. (…) The irises have all been taken, but what was the lowest clump, opposite Syon House, has lost its pride of place, for now there are some by the Grove Park Estate below Kew Bridge. The centre of the eyot is yellow with patches of marsh-marigold in the hot spring days. Besides the marsh-marigolds there are masses of yellow camomile, comfrey, ragged robin, and tall yellow ra-
nunculus, growing on the muddy banks and on the sides of the little creeks among the willows, and a vast number of composite flowers of which I do not know the names. Common reeds are also increasing there, with big water-docks, and on the edge of the cam-shedding of the lawn which fronts my house some of the tallest giant hemlocks which I have ever seen, have suddenly appeared. (...) The agriculture pursued on it is the growing of osiers. These, frequently inundated by high tides, and left dry when the ebb begins, are some of the finest on the Thames. At the present moment (January 5, 1902) they are being cut and stacked in bundles. In the spring the grass grows almost as fast between the stumps as do the willow shoots. This is cut by men who make it part of the year’s business to sell to the owners of the small dealers’ carts and to costers.”

From obtaining its status as a natural reserve in 1993, Chiswick Eyot continues to maintain a similar microecological system today, consisting of willow trees and reeds, as well as native wildlife. Some of the most significant species present include swans, ducks, cormorants, robins, and even fish, which have been returning since 2011, as Cornish had hoped a century ago.

Even though the island is not connected to the surrounding city, if one wears a good pair of wellington boots to avoid being covered in mud from the riverbed and is careful not to slip, the island is reachable once a day when the tide is low. With the support of Thames21 and the Old Chiswick Protection Society, the community surrounding Chiswick has been enacting protection measures for many years to secure the area from erosion, which is caused by the natural movement of water as well as boat traffic, among other factors. Using branches (withies) that grow from the willows on the island, community volunteers build and restore the berms an-
ually, which prevents vertical mud slides, thus stabilising and reinforcing the island’s riverbanks. ⁵ (FIG.2 and 3)

This act of care is even more crucial today, since the preservation of the island is threatened by the introduction of non-native species, such as *Eriocheir sinensis* (Chinese mitten crab), a medium-size crab species originating from Asian waters, and *Impatiens glandulifera* (Himalayan balsam), an evergreen weed that originates from the Himalayas. The Chinese mitten crab has been arriving in London via ships from the early 20th century. ⁶ Since then, the species has thrived in rivers and mud beds, feeding on small aquatic animals, and becoming a major competitor that beats out native species due to its larger size, voracity, and rapid fecundity, as well as its ability to adapt to more polluted waters. Moreover, unlike native species, it can quickly dig into muddy banks and create a complex system of burrows, which further exacerbates the erosion that is already caused by tides and water flow. As with other parts of the river, the Chinese crab populates the river-banks of the island surrounding Chiswick Eyot, affecting its delicate ecosystem.

In addition to the threat posed by the Chinese crab, the Himalayan balsam is classified as an invasive and non-native species that was first introduced into the United Kingdom in 1839 for the purpose of embellishing gardens. ⁷ Plants such as this can spread rapidly when close to rivers, making soil and undergrowth more vulnerable and unsupported by perennial roots, which are essential to maintaining a compact soil profile. This makes it detrimental to other low stemmed
plants. Even though the 1981 English Countryside Act prohibits both the crab and balsam plant, their spread remains almost unchecked.

By placing berms around the area, crabs and other invasive species are partially prevented from entering. Likewise, the planting of new willows, alongside maintaining existing vegetation, allows for the simultaneous eradication of invasive species, such as the Himalayan balsam.

In conclusion, the community has created a perfect circulatory system, where every element has a specific purpose that helps maintain a healthy ecological balance as well as the area’s historical heritage. In protecting the soil from erosion, the entire biodiversity (biota) of the island is preserved. Willows, ducks, cormorants, and other bird species interconnected with the ecosystem continue to proliferate. Additionally, by choosing willows instead of stone or concrete, the community has adopted a solution that is not only more sustainable, but also bears cultural significance.

Therefore, the technique of willow spiling, inherited as a form of ancient technological knowledge, and now incorporated into sustainable engineering methods, otherwise known as soft engineering, enables the creation of a balanced relationship between humans and nature, conserving the latter while meeting the needs of the former. Through the construction of willow spiling berms, the community participates in an ongoing process of caring for and monitoring the island. It begins with manual labour; volunteers plant, sow, grow, cut, and finally weave the willow branches to construct an object
FIG. 2 Chiswick Eyot. Detailed view of the berms created by the willow spiling technique. Picture by Chiara Toscani.
FIG. 3 Chiswick Eyot. View of the island from the riverside. Picture by Chiara Toscani.
of care that represents a negotiation between nature and culture. It seems to also respond virtuously to a new notion of nature which acknowledges that animals and plants, especially invasive species, can all play an active and important role within the city, just as humans do.

The microenvironment at Chiswick Eyot has not just provided me with useful and deeper insights into how contemporary ecological issues directly and evidently affect our everyday lives in London. Specifically, it speaks to more than the general transformation of urban environments, informing the many aspects of my historical investigation which are closely related to those methods of repairing the island and the type of community that is created through this collaborative care. These instances reveal a common principle of care that transcends time and geography.

In light of these additional observations, I come to reinterpret and summarize my historical findings, revising my original question and argument toward identifying the main contributions of my thesis.

**Key argument’s revision and synthesis of research findings.**

At the beginning of my investigation, I posed the question: How does the contemporary instability of the nature/culture relationship affect cities, territories and their future imaginaries? My argument has been developed by ex-
a mining the history of ideas and practices through the lens of the Arcadian discourse, concerning ecological approaches *ante litteram* which can be discovered and used as a basis for addressing this question.

This argument has presented two challenges. The first was to identify *ante litteram* ecological approaches, ideas and practices, within the context of human-land interactions in the extended territory of Venice between the 15th and 17th centuries. This has been pursued within the body of the research, beginning with Virgil and the origin of the Arcadian genre, followed by its re-emergence in Italian culture and its influence on Leon Battista Alberti’s *Theogenius*, and ultimately analysed in the works of other authors, including Cristoforo Sabbadino, Alvise Cornaro, and Giovan Battista Aleotti.

The second challenge is to summarize these historical findings, derived from the application of the Arcadian discourse, to validate their consistency with contemporary ecological thinking.

By interpreting these historical findings through the concept of care, first reinterpreted by Joan C. Tronto, who has provided a revision of the term with a strong political meaning as a revolutionary act in Western society,⁸ and then extended by Maria Puig de la Bellacasa, they can be directly connected with current ecological debate.⁹ In fact, by considering Bruno Latour’s thoughts,¹⁰ de la Bellacasa has examined the concept of care as an essential component, even if ambivalent, of “thinking and living in more than human worlds” which is “vital in interweaving a web of life.”¹¹
“Staying with care’s potential to disrupt thus is not (only) about making visible neglected activities we want to see more “valued”—for instance, as “productive” activities with an economic worth that should be recognized. It requires engaging with situated recognitions of care’s importance that operate displacements in established hierarchies of value and understanding how divergent modes of valuing care coexist and co-make each other in non-innocent ways.”

In a world where nature and culture are so entangled, de la Bellacasa claims, sustainability depends on how much we care and through which kinds of care we engage with the world, in terms of quality and time. In light of their contribution, the Arcadian approach, as has been fielded through my research, can be seen as an earlier expression of care that guarantees its consistency and validity in defining the connection between past and present.

Continuing with this thought, the concept of care as an interpretative key is developed here through three perspectives: (inter) acting with care, engaging with care, and describing with care.13

*(Inter) acting with care*

De la Bellacasa claims that the concept of care embodies a tactile physicality, which offers a distinct alternative to the “techno-scientific perspective”14 of “human-soil relationships.”15 From this perspective, the practice of care blurs the boundaries between self and other, humans and nonhu-
mans, honouring the “subjectivities” introduced by Guattari.\textsuperscript{16} It generates new spatial proximities; it disrupts “anthropo-centered temporalities” in favour of different temporal paces between realms; \textsuperscript{17} it discloses a new “tension between the concrete and the speculative”\textsuperscript{18} since “we think and therefore we touch;”\textsuperscript{19} it counteracts against “the bifurcations between subject and objects, affects and facts, politics and science.”\textsuperscript{20} Touching is an intermediate sense that links the process of thinking with action and embodied processes. Looking at the concept of care from this perspective, in a particularly figurative way, leads me to believe that certain ways of managing the relationship between human-land interactions produce the same proximity. As a result, this concept may contribute to determining an intertwined relationship between theoretical and practical approaches, as well as among different knowledge apparatuses. In this sense, the perspective can be extended and rephrased into the broader concept of (inter) acting with care. Regarding this, the thesis identifies relevant historical precedents.

There is no doubt that the Arcadian genre, and particularly Virgil’s texts, established a precedent for outlining the concept of (inter) acting with care through the description of “subjective” approaches.”\textsuperscript{21} The first and second books of the \textit{Georgics} are entirely devoted to various aspects of field and plant cultivation. These include soil quality, ploughing and sowing, celestial signs, and practices to prevent natural disasters. Beyond the technical content, it is significant how Virgil conveys this information by repeatedly using the word ‘care’
in relation to how trees should be grown, how the ground should be prepared for planting, and vine leaves managed without being cut.\textsuperscript{22} Virgil goes beyond specific techniques or methods in an illustration of how humans should relate to the environment with care. In \textit{the Eclogues}, a similar perspective of care appears throughout the text, not through the explanation of agricultural methods, but rather in a representation of the lives of shepherds and their innate affection for animals, plants and the land, which is often expressed through tactile gestures as well as song and voice. In such an affectionate way, Meliboeus tragically greets his homeland: “For these have we sown our fields! Now, Meliboeus, graft your pears, plant your vines in rows! Away, my goats! Away, once happy flock! No more, stretched in some mossy grot, shall I watch you in the distance hanging from a bushy crag; no more songs shall I sing; no more, my goats, under my tending, shall you crop flowering lucerne and bitter willows!”\textsuperscript{23}

Furthermore, numerous documents and treatises, selected and analysed in this thesis, demonstrate that managing the relationships between human beings and their environment with care requires a combination of ethical and social concerns.

In this sense, my investigation of Alberti’s works, particularly \textit{Theogenius}, an Arcadian tale, revealed his ethical concerns about nature and the dangers that human avarice and frailty pose to it. His thinking is developed through the second book of \textit{On the Art of Building in Ten Books}, outlining principles that guide human modifications and alterations of
territory: “nothing should be attempted that lies beyond hu-
man capacity, nor anything undertaken that might immediate-
ly come into conflict with Nature.”
A surprising statement at the time that reveals how ethical
concerns and principles were at the core of (inter) acting with
care in the human-environmental relationship, and how they
specifically influenced Alberti’s formulation of his theory of
the art of building.

In warning and recalling the reader in the last book
of his treatise, Alberti again discusses his reasoning regard-
ing architecture, by reference to the initial human-land/water
transformations that form the basis of the relationship be-
tween nature and culture, “finding, channelling, selecting and
storing,” echoing the expressions used in his premise, “cut-
ting through rock, (...) tunnelling through mountains or fill-
ing valleys, (...) restraining the water of the sea and lakes, and
draining marshes, (...) altering the course and dredging
the mouths of rivers.” This is where a gem, long neglected by
scholars, can be found a few pages on; a detailed description
of how to stabilize riverbanks with vegetation, which may be
the first written evidence of this type of practice in architec-
tural treatises: “When building the bank, some prefer to turf it
over with grass cut from meadows; I too am in favour of this,
because the intertwining roots bind the material, provided it is
packed together tightly.”

The absence of similar testimonies in other treatises,
such as Barbaro’s commentary on Vitruvius, can lead to the
hypothesis that this served as a coherent component of Al-
berti’s ethical concerns towards nature. This hypothesis could also explain why these testimonies have diminished in subsequent architectural and water management treatises. Throughout the centuries, the broad, rich and multidisciplinary source of empirical knowledge has been replaced by specialization of disciplines and overreliance on techno-scientific expertise.

In this sense, Giovan Battista Aleotti’s work, *Del-la scienza et dell’arte del ben regolare le acque*, published around the end of the 17th century, stands as an exception. For the historical period and geographical context examined, my research has considered Aleotti’s work a last testament to the understanding of human-land interactions with care. His discourse on the art of managing water, in accordance with the humanistic tradition, incorporates a variety of perspectives, including political, investigative and social concerns. Even if in a more conciliatory mode than Alberti, it is by reflecting on them that Aleotti defines the aim of art to “help” humans cope with natural catastrophes and improve their living conditions; when “fields do not bear fruit, peasant families unaccustomed to earning their own bread are usually reduced to a miserable state.” In accordance with this, Aleotti incorporates a variety of practices derived from local knowledge and material cultures to protect, repair and transform territories. These practices were considered as valuable as scientific advancements such as hydraulic machinery and mathematical calculations.

Although not accompanied by profound ethical and social reflections, other fragments of these practices have
been traced in minor authors between the 15th and 17th centuries, including Paulini, who proposes, in his supplica to the Republic of Venice in the early 17th century, the adoption of practices to manage river banks and surrounding lands by using vegetation grown according to similar techniques outlined by Alberti almost two centuries earlier. Similar experiments, supported by beautiful drawings, are to be found in the late work of Carlo Bettoni and particularly the 1782 treatise, Pensieri sul governo de’ fiumi, which followed the principles of the Italian naturalistic hydraulics school, consolidating this legacy and embracing holistic and plural approaches to be situated between mathematical modelling and empirical practice. The soil was thoroughly observed, plants were carefully selected to suit their environment and climate, and their growth was awaited and cared for in accordance with natural cycles.

Considering the above context, before the form of the hydraulic discipline was cemented, the thesis turns to Cristoforo Sabbadino’s approach. He demonstrated that the close relationship between concrete and speculative thinking could be taken up as a successful method for working. When imagining him walking around the lagoon, taking notes about its health and formulating proposals for its healing, one can understand his condemnation of those engineers, such as Alessi Aleardi, who attempted to propose solutions for Venice’s lagoon without proper knowledge of the local territory. As a result, his personal experiences were crucial in generating his view on the lagoon as an extended organism, which included
Venice and its immediate surroundings as well as the flat and mountainous regions of Terraferma.

Engaging with care

Tronto’s political reframing of the concept of care suggests that it is a revolutionary act of “support and burden to help maintain and preserve political institutions and the community.” According to her, therefore, the concept of care can rejuvenate and strengthen the bonds among citizens and provide refreshed social perspectives. Consequently, if “what we care about determines what kind of society we are,” taking care of the environment is equivalent to caring for the health of individuals and the community, and vice versa. Engaging with care, therefore, focuses on how those acts of maintaining, repairing, and transforming the environment with care reveal civic implications for tightening society and the bonds of community. The thesis identifies historical precedents, often appearing in the form of the pronoun “we,” which are both explicitly used in the treatises considered here as well as implicitly embedded in their descriptions of collective practices.

By analysing Virgil’s first, this thesis has explored for the first time how the pronoun “we” performs a semantic role. The “we” in this context not only refers to the community’s members who are facing eviction from their lands but also embodies their connection with these places, includ-
ing with the animals and plants that inhabit them as well as the concrete matter and objects that constitute them. A caring engagement creates these bonds, which the Arcadian genre vividly captures.

In *Theogenius*, Alberti uses the pronoun “we” in a more articulated manner. Here, the human virtue is pointed out as the caring principle that should lead human behaviour towards others and the environment: “We don’t live just for ourselves.” 39 In this context, the term “we” strongly illustrates the concept of care which it invites us to embrace and extend towards others, offering support and bonding with them. Furthermore, considering the merciless description of human avarice that begins this dialogue, this “we” certainly includes the natural environment and nonhuman species as well. However, this invitation to engage as “we” towards others remains abstract; it is a warning, but it lacks a clear physical dimension. Alberti expresses the intellectual meaning of engaging with virtue and care. He outlines the spiritual foundations but does not seek to shape them.

There is a hint of this type of engagement in Leonardo Bruni’s praise for the “industrious citizens” of Florence who take care of “everything. Things are arranged, that while all dirt is cleaned up, you only encounter those things that bring joy and are pleasing to the senses.”40 This constitutes the source of the material and immaterial beauty of the city.

Bruno’s description of Florence links to Venice. In this thesis, Venice constitutes the most relevant example of citizens’ engagements regarding the management and pro-
tection of their city and territorial environment, in keeping canals clean, for example. As demonstrated by scholars such as Dennis Romano, Nelli-Elena Vanzan Marchini, and Piero Bevilacqua, the inherent fragility of Venice and its lagoon compelled its first insular communities to develop a peculiar ability to care for their environment from an early age, which was based on the awareness that “their health coincided with that of their amphibian habitat.”\textsuperscript{41} Citizens’ engagement with the environment was based on an understanding that this work should be shared on a community-wide level. Consequently, this tended to strengthen bonds between insular members of the first settlements and Venetian citizens who came later as the city’s structure developed; the city environment and its surrounding territory could only be protected and maintained by a unified community with a shared purpose.\textsuperscript{42}

Evidence for this can be seen in Marco Cornaro’s words, who recalls in 1450 that “the roads that used to be swept up and cleaned every Saturday are not taken care of today (...) Everyone throws their trash publicly and lets them get filthy in the water,” and invites his fellow citizens to act according to an “idea of community that all Venetians are urged to recognize and share.”\textsuperscript{43}

Therefore, as Bevilacqua clearly highlights, “[Venetian] citizens were thus asked not only for obedience, but also for conscious cooperation, responsible behaviour, and extra moral commitment. A metaphor of common destiny. That fragile and threatened habitat embodied a principle of community that all Venetians were urged to recognize and share.”
However, one might think such engagement was possible in a primitive societal structure, but that it would have dissipated as a consequence of the subsequent centralization of public institutions in the Venetian Republic, following the hierarchization of Venetian society that began in the 16th century. In this context, Venice’s singularity consisted of its attendance to two levels of engagement. One was regulated and promoted by public institutions and laws, such as the Magistrato delle acque, which gradually became more structured and focused on broader environmental issues, including the regulation of land reclamation on the mainland as well as the protection of the lagoon against infilling processes. The second level of engagement was based on Venice’s citizens’ day-to-day activities. It was not based on written rules, but on learned behavior inherited from tradition, shaped by the geographical peculiarities of Venice, and improved through the effectiveness of achieving results in relationships with the environment.

According to Bevilacqua, this singularity was also amplified by “a closer physical relationship between institutions and citizens” which made their engagement not just unique but also vital throughout time. In fact, even when the “Age of Water” began in the 16th century, and the extensive diversions of rivers on the mainland required a more technocratic and centralized intervention from the Republic of Venice, this work continued to involve communities of fishermen with the task of monitoring the waters, observing movements and reporting alterations.
Paulini’s codex demonstrates that citizens’ engagement with environmental issues extended beyond Venice. His suggestion to slow down the infilling process along with his warnings regarding the exploitation of the Belluno forests are evidence of an expanded perspective. Therefore, newly conquered mainland populations also adopted this attitude, not only in the care of rivers but also for forest management.

There was also another aspect to this kind of citizen engagement. Through it, local empirical knowledge was preserved without being entirely replaced by updated technical solutions or theoretical interpretations. This admixture of empirical and theoretical approaches was the foundation of Venice’s maintenance strategies, as presented by Sabbadino in his observations of the lagoon and research concerning solutions to the infilling process. This approach which had begun in the 16th century was then kept alive by the Italian naturalistic hydraulics school until the 19th century.

Describing with care

Anna Tsing suggests that in order to study the interactions and disturbances caused by human beings in the landscape we should recreate “new genres of translation and play (...) and relearn the art of the description involving an interdisciplinary revival of descriptive methods across disciplines anthropology, history and its turn to environmental narration,
In claiming this, Tsing indirectly suggests that the concept of care can be elaborated beyond the notion of thinking with care, as suggested by de la Bellacasa, by describing with care human and nonhuman stories in order to gain a deeper understanding of different and often overlooked perspectives. Rachel Carson’s work represents a precious source to interpret and reveal aspects of the describing with care concerning my historical findings and their nuances.

Carson’s Silent Spring adopts many of the narrative strategies and figures of the Arcadian genre, which prove essential for her depiction and discussion on contemporary environmental issues.

“There was once a town in the hearth of America where all life seemed to live in harmony with its surroundings. (...) The countryside was, in fact, famous for the abundance and variety of its bird life, and when the flood of migrants was pouring through in spring and fall people travelled from great distances to observe them. (...) Then a strange blight crept over the area, and everything began to change. (...) There was a strange stillness. The birds, for example—where had they gone? Many people spoke of them, puzzled and disturbed. The feeding stations in the backyards were deserted. The few birds seen anywhere were moribund; they trembled violently and could not fly. It was a spring without voices. On the mornings that had once throbbed with the dawn
chorus of robins, catbirds, doves, jays, wrens, and scores of other bird voices there was now no sound; only silence lay over the fields and woods and marsh.”

In 1962, the year of its publishing, *Silent Spring* opens with the words, “There was once,” which, like a fairy-tale, begins by describing an unknown town’s seasonal changes in the U.S.A. Carson describes the prosperous spring in terms of the flourishing fields and orchards, as “white clouds of bloom”; Autumn is depicted by the variation of colours in the woods and climate: “half hidden in the mists of fall mornings, home to foxes, deer, and shorebirds”. Through these seasonal landscapes, human beings appear merely as spectators, amazed each year by new growth. This familiar arcadian image of the countryside is conveyed in the first two paragraphs by Carson in terms of nature’s seasonal and eternal cycle, but also through the presence of animals.

However, this idyllic trope is suddenly subverted in the third paragraph. The poetic atmosphere would be maintained if “a strange stillness” did not change the landscape’s sounds: “It was a spring without voices.” The birds that appear nested and migrate across the works of Virgil, Alberti, and White, as well as many others since, are now no longer able to sing. Their death was caused by pesticides, used to preserve monocultural agricultural lands since the mid-1940s, as humans engaged in a dangerous “war against nature”. The damage was so extensive and severe that it was comparable to the first drop of the atomic bomb. In the eighth chapter of
Carson’s text in particular, entitled *And No Birds Sing*, she explains the complex biological chain of events that eventually led to the extinction of countless common birds such as the robin, in large parts of the U.S.A, including Mississippi, Alabama and Louisiana in 1954. Pesticides were spread in order to fight a fungus imported from the veneer industry which had started to affect the local elms. Then, contaminated soil led indirectly to the death of birds via the ingestion of worms.⁶⁰

In addition to her contributions to science and her pivotal role in reporting on one of the most significant ecological disasters of our time, it is also important to focus on her narrative style, since it appears highly singular. A revolutionary aspect of her writing consists in her reintroduction of wonder into scientific descriptions of nature. As noted by Jill Lepore, she leaves her readers “swooning, drowning in the riptide of her language.”⁶¹ In describing the natural world, this sense of wonder might be seen as irrelevant, if not even anti-scientific, being infused with affection and curiosity. Nevertheless, Carson’s work indicates that this can act as a catalyst for formulating original hypotheses and exploring new naturalistic directions. This approach results in a movement away from a human-centred perspective where the natural world is described through a combination of poetic components and crystalline observations of it. Accordingly, describing with care can be understood as a type of storytelling that encompasses multiple levels of understanding and observations which employ a variety of expressive techniques. Writing, therefore, plays an active and operative role in shaping
reality rather than merely transcribing it.\textsuperscript{62}

From this perspective, the thesis has attended to many texts - by Pliny, Virgil, Alberti and, to a certain extent, Sabbadino and Aleotti - which utilize a similar combination of poetry and crystallized description to create a more comprehensive and profound understanding of the natural world, imbued with the concept of care.

Virgil’s \textit{Eclogues} are imbued with this combination. For example, his cosmological-philosophical explanation of the world’s birth in the sixth eclogue, and picked up again in the \textit{Georgics}, can be considered a sort of pre-scientific component in his texts. In combining this writing with poetic components – in terms of content and language - as well as historical-political events, his texts express a principle of care that embraces human and nonhuman realms and various levels of understating them.\textsuperscript{63}

Leon Battista Alberti’s \textit{Apologhi} and \textit{Intecenales} are further examples of this type of storytelling. Here, the author describes animals and other living beings through accurate observations of their features and behaviors from an almost naturalistic perspective. This is triggered, however, by a wonder for nature that results in a poetic narrative enhanced by ethical reflections. Through these two symmetrical perspectives on nature - naturalistic and poetic - Alberti developed his reflections on the role of arts and architecture.\textsuperscript{64}

Cristoforo Sabbadino’s \textit{Discorsi per la Laguna di Venezia} also contains poetic fragments alongside proto-scientific and technical writing.\textsuperscript{65} The text begins with a sonnet in
which Venice is portrayed as a woman that faces danger due to the destructive effects of rivers, the sea and, above all, human greed. It should be noted that this image coincides with a perspective on the lagoon that transcends merely geographical or technical descriptions, instead embracing a dimension of care that allows Sabbadino to understand and describe the complexity of its intrinsic dynamics and interactions in considering the lagoon and Venice equally as an embodied living organism.

Giovan Battista Aleotti’s treatise included fragments of Torquato Tasso’s and Petrarch’s poetry in the investigation of the art of managing water. Even in this case, rather than investigating his reasons, it is worth underlining how Aleotti’s approach is consistent with the multidisciplinary and encompassing nature of his text. It contains social observations and concerns, references to historical events and descriptions of mathematical calculations of the speed of water, as well as cartographic techniques, which appear to have been updated in light of recent technological and scientific advances.

Investigating Carson’s texts further, one can discover that her poetic writing is made up of specific rhetorical figures commonly used within poetry and other types of literary genres.

In her first book, Under the Sea Wind, she describes the sea as a “central character” across three different landscapes: the seacoast, the open sea, and the seabed. She focuses on three similar animals: the black skimmer, the mackerel, and the eel, describing their journeys and relatively complex
ecological systems. In this sense, she aimed to capture the perspective of animals; getting “the feeling of what it is like to be a creature of the sea requires the active exercise of the imagination and the temporary abandonment of many human concepts and human yardsticks.” Therefore, Carson comes to address the eel in the third person, gendered as a female: “she knew her way among the swaying (...) she knew where to find the spring peepers (...) She knew the soft mud beds deep in the bottom of the pond.” Similarly, the dark skimmer is described in the third person as a male. Above all, Carson anthropomorphizes the animals’ behaviour to create a connection between the animal and the reader, thereby conveying a way of describing with care.

The thesis has illustrated many examples of anthropomorphized animals and plants, first in Virgil’s Eclogues as well as in Alberti’s Apologhi. However, the most relevant use of this rhetorical figure has been found in Cristoforo Sabbadino’s description of the lagoon of Venice as a woman’s body, producing the effects that I have described above.

These associative possibilities, rooted in history, can be considered a valuable source for defining the contemporary morphism suggested by Latour.

Although, the long-term validity of this anthropomorphic metaphor, as a way of thinking with and caring for nature, makes it easy to understand why Carson was conscious of stepping beyond academic rules: “certain expressions which would be objected to in formal scientific writing. I have spoken of a fish “fearing” his enemies, for example, not
because I suppose a fish experiences fear in the same way that we do, but because I think it behaves as though it were frightened. With the fish, the response is primarily physical; with us, it is primarily psychological. Yet if the behaviour of the fish is to be understandable to us, we must describe it in the words that most properly belong to human psychological states.”  

Carson evokes a kind of care which recalls Virgil’s observations of the behaviour of birds: “their minds change, and their breasts now conceive impulses.”  

For example, the eel is described throughout the poem in terms of her “unusual restlessness.” Likewise, the river water is described through the “noisy voice of a young stream,” as if it were a human.  

It is also noted by Carson that time is not uniquely determined, but varies according to animal species: the lifespan of dark skimmers is influenced by the moon phases, as well as the daily lowering and rising of tides; the lifespan of mackerel is influenced by the seasons; and the lifespan of the eel is determined by the adults’ journey to the sea and the young eels’ return to the river, which also exceeds the passing of the seasons. Instinctive and geographical memories bind one generation to another through a temporary cycle. Despite the use of this narrative strategy, none of Carson’s works appear undermined in terms of their credibility or effectiveness – in fact, it is quite the opposite. By bringing to light nature’s beauty and its mysteries through her “intimate” contribution, Carson proves that science and literature can coexist.

In this sense, Giovan Battista Aleotti’s treatise on hydraulics can be considered a fundamental precedent since it
combined literary references with various topological categories of poetry, visual arts, architecture, and the first notions of hydraulic science in a single autonomous work.

In conclusion, describing with care can be interpreted as drawing with care. In particular, the maps of Cristoforo Sorte and how they were drawn are examples of a unique way of describing the world with care, set out before cartography evolved into a scientific and technical discipline. Sorte was able to gather in his maps neglected elements such as testimonials from residents in remote areas, which could only be discovered by visiting, examining, and experiencing the natural and human landscapes first-hand. Following the same aim of conveying the intimate and immaterial nature of these places, he represented them from different points of view, such as overlapping perspectives with orthogonal views, without aiming to be truthful but rather to grasp and provide multiple levels of understanding regarding the places that he mapped. Thus, his maps can be viewed as a great form of graphic poetry.

Contributions of the thesis

The synthesis of the historical research findings and their interpretation via the concept of care, reframed through contemporary thinkers including de la Bellacasa, Tronto and Tsing, has allowed me to demonstrate the validity of the Arca-
dian discourse in unearthing ideas and practices that prepared the ground for contemporary ecological thinking, and its consistency with the most up-to-date cultural and philosophical background.

Therefore, the objective of the thesis is twofold: the study seeks to demonstrate the value of historical research and to use the results of the investigation as a tool for contributing to contemporary ecological debate on two levels. On a general level, it enriches ecological thinking and broadens the scope of humanistic and environmental historical studies. Consequently, this challenges the notion that ecology is limited to emergencies and future needs rather than being a subject of historical discourse.

In addition, by identifying and highlighting those findings which can be interpreted from an ecological perspective *ante litteram*, the thesis makes them operative in addressing contemporary instability of the nature/culture relationship in its impact on cities, territories, and their future imaginaries. Using de la Bellacasa’s words, this historical research has supported the resurgence of “practices that encourage novel alliances, sensitivities, affectivities, intimacies and material relations.” The thesis highlights the importance of cultural practices and empirical knowledge as an essential complement to the technocratic approach rather than merely being its historical antecedent, as a linear evolutionary perspective would suggest. In addition, it has highlighted the mechanisms of engaging people in processes of environmental care, establishing a clear link between the technical, the material, and
the social dimension/aspect, in which the concept of participation plays a crucial role in the effectiveness of ecological approaches.

Situating my historical research between the 14th and 17th century in Italy has a precise intent since this period is crucial to what I recognize as a paradigm shift which found its fulfilment in the 17th century, as acutely highlighted in *The Order of Things* by Michel Foucault.77 Thus, in this transitional phase, it is possible to identify various generative and multifaceted perspectives embedded in its cultural framework. Therefore, the investigated works may be viewed as attempts to suggest alternative approaches and outcomes where the understanding of the world is based not on specialized knowledge but rather on the integration of art, poetry, technology and science.

Considering that the greatest challenge of contemporary ecological thinking is how to deal with the irreducible complexity of ecosystems, the acknowledgement of an inherited system of knowledge is essential for developing future imaginaries. This does not refer to the instrumentalization of the past or present to achieve a future, but rather to the processes involved in simultaneously theoretical and operational trajectories.
Endnotes

1 The traditional AA summer school for 2021-2022 was centered around the new idea of Togetherness. I wrote a proposal called “Connecting islands with affection” with Claudia Nitsche, in which the concept of Togetherness was interpreted as one of the highest expressions of ecological thinking from an ethical, physical, and spiritual perspective. To better understand multiple aspects, we focused on the Thames and the constellation of islands that line its course. The river and its islands provided the ideal place to investigate and experiment with the concept of cohabitation and coexistence between species, including humans, animals, plants and minerals.


4 Thames21 is an association of volunteers responsible for caring for London’s network of waterways, working closely with the local community. https://www.thames21.org.uk

The Old Chiswick Protection Society is an association of volunteers responsible for caring for the Chiswick area, its buildings, public spaces, and the natural environment. https://www.oldchiswickprotectionsociety.co.uk

5 The word berm refers to a raised barrier, which is usually made of soil, but can also be made of timber. The word originated in the Dutch language and was incorporated into English vocabulary. This is a very probable hypothesis given the contribution the Dutch made to the reclamation of the Fens region and the Thames. In particular, willow spiling is the traditional technique of preventing soil eroding from riverbanks. The willow rods are interwoven between uprights in the bank and then backfilled with soil to allow the willow to grow horizontally and vertically.

6 Chinese crabs were first sighted in Kent in 1935. Since then, they have spread throughout the Thames.

7 This classification comes from the Wildlife Trusts organization in the U.K.

8 “I propose that thinking about caring in its broadest and most public form, as a way in which a society allocates responsibilities, offers a substantive opportunity to reopen the closed, game-like political system to the genuine concerns of citizens. (…) nothing will get better until societies figure out how to put responsibilities for caring at the center of their democratic political agendas.”


10 “Can we devise another powerful descriptive tool that deals this time with matters of concern and whose import then will no longer be to debunk but to protect and to care, as Donna Haraway would put it? Is it really possible to transform the critical urge in the ethos of someone who adds reality to matters of fact and not subtract reality? To put it another way, what’s the difference between deconstruction and constructivism?” Bruno Latour, “Why Has Critique Run Out of Steam? From Matters of Fact to Matters of Concern,” *Critical Inquiry* 30, no. 2 (2004): 225–48.


12 Ibid., 6.

13 These perspectives resound consistently with the three registers described by Guattari, by which I previously defined the Arcadian discourse and now turn to consider through a contemporary concept of care. See introduction, endnote 48.

14 “Everywhere we witness continuous experimentations with matter, processes and practices, as well as temporalities and rhythms offering alternatives to dominant, quick techno-scientific fixes that accelerate large-scale transformation processes of enclosure, accumulation, extraction and ultimately destruction.”


16 See introduction, endnote 48.


18 Ibid., 95.

19 Ibid., 19.

20 Ibid., 97.


22 “And when their early youth has fresh leaves budding, you must spare their weakness, and while the shoot, speeding through the void with loosened reins, pushes joyously skyward, you must not yet attack the plants themselves with the knife’s edge, but with bent fingers pluck the leaves and pick them here and there. Later, when they have shot up and their stout stems have now clasped the elms, then strip their locks and clip their arms – before they shrink from the knife – then at last set up an iron sway and check the flowing branches.”


See the second chapter of the thesis, “Nature(s). Two symmetrical views of nature in Alberti’s thought.”

25 “Then there is damage caused by man. God help me. I sometimes cannot stomach it when I see with what negligence, or to put it more crudely, by what avarice they ruin things that because of their great nobility the barbarians, the raging enemy have spared”


26 Ibid., 321.

27 Ibid., 3.

28 “However, it must be admitted that book 10 does not respect the rules of textual construction of the De Re Aedificatoria. It goes beyond the contents which the prologue had assigned to it and sacrifices the rule-governed function of the textual operators to picturesque anecdote and a long, dissertative digression inspired by Vitruvius concerning water and hydraulic works, which occupies more than two-thirds of the text. The tenth book, in fact, turns out to be a catchall. We might compare it to a blind window that gives Alberti’s edifice a Vitruvian appearance, or we might view it as a mere appendix of mediocre quality, superfluous to Alberti’s textual construction which is so imposing in all its parts by virtue of the rigor and coherence of its architecture.”


29 The entire text is included in the second chapter, sub-chapter “Nature(s). Two symmetrical views of nature in Alberti’s thought.”


30 “Necessity, teacher, and creator of beautiful wisdom, has strained many people who suffer floods of rainwater in their already fertile countryside by various accidents, to go investigating the aids of art. Where nature could not provide them with sufficient remedy or where they lacked the help of nature, they have learned how to provide for themselves with art.”


31 Ibid., 494.

32 See FIG. 7-12 in the fifth chapter.

33 See the fourth chapter of this thesis, sub-chapter “Paulini’s Codex: the mountain’s perspective,” and FIG. 11-12-13.

34 See FIG. 28-32 in the fifth chapter.
35 See the fourth chapter of this thesis, sub-chapter “Cristoforo Sabbadino, Discorsi per la Laguna di Venezia.”
38 “You, Tityrus, lie under the canopy of a spreading beech, wooing the woodland Muse on slender reed, but we are leaving our country’s bounds and sweet fields. We are outcasts from our country; you, Tityrus, at ease beneath the shade, teach the woods to re-echo fair Amaryllis.” Virgil, Eclogues, 25, lines in Latin 1-5. See the first chapter in this thesis, sub-chapter “The Eclogues and the Georgics by Virgil.”
41 (Translated by the author) Nelli E. Vanzan Marchini, Venezia civiltà anfibia (Verona: Cierre edizioni, 2009), 120.
42 Romano explains how Venice’s sense of community survived the development of a hierarchical structure at the beginning of the 15th century: “the sense of the city as a group of communities corresponding to parishes. Yet the interests of any particular community were subordinate to the larger, common good.”
43 (Translated by the author) Marco Cornaro, “Scrittura sopra la laguna. Scrittura 1, 2, Sopra i boschi: Dello stato della città di Venezia per la negligenza e disobbedienza dei suoi cittadini,” 151.
47 See the fifth chapter in this thesis, sub-chapter “Benedetto Castelli, Considerations on the lagoon of Venice and other cases studies. The recent
discovery of historical documents along with Benedetto Castelli’s treatise by Pietro Daniel Omodeo demonstrates the fishermen’s involvement.

48 See the fourth chapter in this thesis, sub-chapter “Paulini’s codex: the mountain’s perspective.”

49 Forests and timber were valuable resources for Venice’s economy and politics.

50 See the fourth chapter in this thesis, sub-chapter “Cristoforo Sabbadino: Discorsi per la Laguna di Venezia.”

51 See the fifth chapter in this thesis, sub-chapter “Italian naturalistic hydraulics school.”


53 The expression thinking with care is borrowed from Maria de la Bellaca-

54 Anna Tsing, “Aura’s Openings: Unintentional design in the Anthropo-

55 The expression thinking with care is borrowed from Maria de la Bellaca-

56 She was in fact defined as a scientist-poet. Definition taken from the article by Jill Lepore, “The Right Way to Remember Rachel Carson,” The New Yorker (2018).

57 Carson, Silent Spring, 21.

58 Ibid., 21-22.

59 “Along with the possibility of the extinction of mankind by nuclear war, the central problem of our age has therefore become the contamination of man’s total environment with such substances of incredible potential for harm—substances that accumulate in the tissues of plants and animals and even penetrate the germ cells to shatter or alter the very material of heredity upon which the shape of the future depends.” Ibid., 25.

60 “The organism invades the water-conducting vessels of the tree, spreads by spores carried by the flow of sap, and by its poisonous secretions as well as by mechanical clogging causes the branches to wilt and the tree to die. The disease is spread from diseased to healthy trees by elm bark beetles. The galleries which the insects have tunneled out under the bark of dead trees become contaminated with spores of the invading fungus, and the spores adhere to the insect body and are carried wherever the beetle flies.” Ibid., 102.

https://www.newyorker.com/magazine/2018/03/26/the-right-way-to-remember-rachel-carson

62 According to Ursula K. Le Guin, different narratives are necessary to begin: “It is the story that makes the difference. It is the story that hid my
humanity from me. (...) It sometimes seems that that story is approaching its end. Lest there be no more telling of stories at all, some of us out here (...) think we’d better start another one, which maybe people can go on with when the old one’s finished.” Ursula k. Le Guin, *The carrier bag theory of fiction* (London: Ignota, 2019), 33
63 See the first chapter in this thesis, sub-chapter “The Eclogues and the Georgics by Virgil.”
64 See the second chapter in this thesis, sub-chapter “Nature(s). Two symmetrical views of nature in Alberti’s thought.”
65 See the fourth chapter in this thesis, sub-chapter “Cristoforo Sabbadino, *Discorsi per la Laguna di Venezia.”
66 See the fifth chapter in this thesis, sub-chapter “Giovan Battista Aleotti, *Della scienza et dell’arte di ben governare le acque.*
68 Ibid., 130-131.
69 See the first chapter in this thesis, sub-chapter “The Arcadian genre,” and the second chapter, sub-chapter “Nature(s). Two symmetrical views of nature in Alberti’s thought.”
70 See introduction.
71 Carson, *Under the Sea Wind,* 5.
72 See chapter 1.
73 “Now it was autumn again, and the water was chilling to the cold rains shed off the hard backbones of the hills. A strange restiveness was growing in Anguilla the eel.” Rachel Carson, *Under the Sea Wind,* 131.
74 Ibid., 131.
75 See the fifth chapter of this thesis, sub-chapter “Maps.”
76 de la Bellacasa, *Ecological Reparation,* 5.
77 It was during this time that the seeds of the separation between episteme, which Foucault describes as a system of resemblances, and scientific specialization were sown.
APPX. 1 Overlap of the phenomena: landfill and submersion process. Diachronic map of barene’s region showing between the 17th and 20th century.
APPX.2 Landfill process of barene’s region. Diachronic map showing between the 17th and 20th century.
APPX.3 Irreversible submersion process of *barene*’s region. Diachronic map showing between the 17th and 20th century.
APPX.4 Barene’s region. Diachronic map showing between the 17th and 20th century.

Barene (salt marshes)

subtraction

addition
Captions

“We have entered a new geologic epoch, defined by human disturbance of the earth’s ecosystem - the Anthropocene. The scale of human disturbance has created unprecedented new crises: a wave of species extinctions, the global spread of emergent pests and disease and unpredictable climate change. New approaches are required to consider these Anthropocene dilemmas.”


The images, APPX. 1,2,3,4, illustrate how human transformations over the last three centuries, from the 18th century to the 20th century, have impacted the intertidal area of the lagoon, modifying the barene (salt marshes) between the land and water. The images highlight how barene have represented the most modified and fragile element of the system. However, they have always had “respiratory” functioning, filtering sea water, preventing soil erosion, holding back debris from rivers, and minimizing flooding and high tides. Especially in the last century, the direct and indirect effects of the buildings of Porto Marghera, Canale Petroli, and the airport, have caused the most extensive, rapid destruction of the lagoon and diminishment of salt marshes ever recorded. They have subverted the balance between dry land, water, and salt marshes, which has always been essential to the lagoon’s proper functioning.

APPX. 1 illustrates a diachronic and synthetic image of these transformations, providing an insight into the actual state of the lagoon and its articulation. It is evident how significantly the salt marshes (purple areas) had been reduced when compared to previous centuries. This image is the result of an overlap of changes considered over the three centuries, pertaining to dry land (green pattern, APPX. 2), water (blue pattern, APPX. 3) and salt marshes (purple pattern, APPX. 4). Each of those images has been drawn based on two fixed elements: the continuous line that corresponds to the lagoon coastline in its current state; and the “original” state of the lagoon and its salt marshes, as shown on the historic map drawn by Angelo Emo in 1763. This serves as a background on which to mark the transformations, depicted as variations. These are illustrated spatially through different outlines and areas and, temporally, through the dif-
different patterns representing 1700, 1800, and 1900.

APPX. 2 illustrates how an extensive part of the lagoon was transformed into dry land, caused by the reclamation and landfill processes throughout the 18-19th centuries (fine grain pattern), as well as indicating how the process continued in the 20th century. These caused a change in the lagoon coastline through the enlargement of Murrazzi, which were previously built up to protect Venice from high tides in 1782. They also contributed to the formation of new islands within the lagoon and the expansion of the land in the northern part, along the lidos that embrace the lagoon. In the southern part of the drawing, the mouth of the Po is visibly extended due to debris accumulation. However, the most significant transformation took place in the central part of the lagoon, due to the construction of the industrial area and airport at Porto Marghera, which transformed a large area of salt marshes into land.

APPX. 3 shows how rising seawater submerged an extensive part of the salt marshes that inhabited the lagoon. These transformations proved to be more impactful than any attempts at reclamation, increasing the imbalance between land, water, and salt marshes. This phenomenon resulted from a combination of causes: the increase in high tides, the shirking of the lagoon, the diversions of rivers, and the lowering of the ground.

APPX. 4 shows how the salt marshes were transformed. Differently from land and water images (APPX 2 and 3), this diagram shows the addition of new salt marshes, along with those that had disappeared and those that had been preserved. As a result, the diagram highlights how a huge area of salt marshes (porous solid pattern) was destroyed. There are very few new salt marshes, which correspond to those that were artificially built in 1900 to compensate for those lost (bold grain pattern). And very few have remained intact since the 18th century (solid pattern).

From the topic of the thesis and research question, this appendix aims to support - even if indirectly through evidence of the most recent destructive effects - an ecological ante litteram conception of the lagoon system toward protecting salt marshes that were recognized as an essential organ of the lagoon body and its functioning. Venetian historical approaches and practices, as described by Marco Cornaro and Cristoforo Sabbadino’s texts published from the 15th and 16th centuries, were informed by this antecedent awareness, which aimed to preserve and maintain a sustainable balance between the environment and human transformations. These approaches, included within what I define as the Arcadian discourse, are
presented up to the 18th century. After this point, as shown by these images, human transformations became extremely intense and, based on what I define as an Imperial discourse, were characterized by a view of nature as a resource to exploit endlessly. This more recent discourse has obscured the reasoning and value of historical Arcadian knowledge.

Resonating with contemporary ecological thinking, these historical approaches, encompassed under the umbrella of the Arcadian discourse, have allowed me to validate the broader idea that historical concerns, principles, and practices can provide valuable information and knowledge to address contemporary environmental issues and manage urban and landscape systems.

*Cartographic sources*

In order to draw the “original” state of the lagoon, a map was used as the primary source:

Angelo Emo, *Disegno della Laguna di Venezia*, 1763.


In order to illustrate the evolution of the lagoon, a variety of maps and other sources were used, which are listed below in chronological order:


Bernardino Zendrini, *Memorie storiche dello stato antico e moderno delle lagune di Venezia e di que’fiumi che restarono divertiti per la conservazione delle medesime* (Padua: Stamperie del Seminario, 1792), Tav. IX.


Atlante della Laguna’s digital data and maps were used to illustrate the most current state of the lagoon (2013):
https://cigno.atlantedellalaguna.it/maps/7/view
APPX.5 Map of rivers’ diversions or other water management around the Venice lagoon before the 16th century.

The Piave River

The Sile River

The Brenta River

Intestadura embankment 1330-1391

Th Piovego Canal 1209

The mouths of the Brenta River

The diversion of the S. Bruson river 1457

The Bacchiglione River

The Po River
<table>
<thead>
<tr>
<th>River Name</th>
<th>Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>The S. Marco River</td>
<td>1534</td>
</tr>
<tr>
<td>The Piave River</td>
<td></td>
</tr>
<tr>
<td>The diversion of the Piave River</td>
<td>1574-1579</td>
</tr>
<tr>
<td>The Sile River</td>
<td></td>
</tr>
<tr>
<td>Cava Zuccherina</td>
<td>1534-1579</td>
</tr>
<tr>
<td>The Brenta River</td>
<td></td>
</tr>
<tr>
<td>The diversion of the Brenta River</td>
<td>1507</td>
</tr>
<tr>
<td>The Bacchiglione River</td>
<td></td>
</tr>
<tr>
<td>The Brenta River from 1540 to 1840</td>
<td></td>
</tr>
<tr>
<td>The Bacchiglione River since 1540</td>
<td></td>
</tr>
<tr>
<td>The Po River</td>
<td></td>
</tr>
</tbody>
</table>
APPX.7 Map of rivers’ diversions or other water management around the Venice lagoon after the 17th century.

The Piave River

The Sile River

The diversion of the Piave River since 1683

The diversion of the Sile 1683

Mirano’s Diversion

Cunetta Brenta 1858

The mouths of the Brenta River

The Bacchiglione River

The diversion of the Brenta River 1610 (Taglio Novissimo)

Porto Viro’s diversion 1604

The Po River
“In the fifteenth century, however, this optimism evidently faltered. Since the first settlement at Rialto the land had been all-conquering; now the water began to threaten. The vocabulary changed, and Venice began to describe itself as imperilled by water, by the very environment in which it had grown up. Its history became that of a place that people had providentially built for themselves to live in but that now found itself under attack by a deadly force. Defending the city from this new danger required unrelenting effort. One by one, the rhetorical mechanisms of an endangered city were put into place.”


The images, APPX. 5, 6, 7 illustrate the river diversions and the construction of artificial canals on the territory surrounding Venice’s lagoon between the 15th and the 17th centuries. These several hydraulic works were intended to stop the lagoon landfill process that had been already evident from the 15th century. The rivers that flowed into the lagoon, including the Brenta River, were considered the main reasons for this first ecological emergency involving Venice. Due to the ever-increasing deforestation in the hills and mountains surrounding the lagoon, and the transformation of these areas into agricultural fields, materials transported by rivers could not be retained and deposited on them. In fact, during flooding, trees acted as a filter and an area of sedimentation along riverbanks, preventing soil, other trees, and debris from moving downstream towards the lagoon. As a result, the accumulation of this debris caused an imbalance in both the lagoon’s water level, and the exchange of salt and sweet water, putting its delicate ecosystem at risk.

Although, the first written testimony and reflection on this phenomenon had been written by Marco Cornaro in Sopra i Boschi (1442), and Della Laguna (1450), Cristoforo Sabbadino was the one who described and examined it in detail in his Discorsi sopra la Laguna di Venezia (1540). In addition to identifying the great enemies of the lagoon, rivers, humans, and the sea, he proposed several solutions, including the diversion of the Brenta, Piave and Sile rivers. It took two centuries for these diversions to be completed, entirely transforming the water structure of Venice’s lagoon.
Each image/map highlights the diversion of the river, realized in the considered century, in red. Contrastingly, the black line represents the trace of the same diversion that had been realized in the previous century. Additionally, the red dotted line signifies the major embankments constructed to prevent river overflows in the considered century, and the black dotted line indicates the trace of those same embankments realized in the previous century.

APPX. 5 This image/map illustrates the first interventions put in place to protect Venice’s lagoon from the landfill process between the 14th and 15th centuries. One of the first attempts to combat this phenomenon was to construct an artificial embankment (“intestadura embankment”), parallel to the lagoon’s shoreline between 1330-1390. This embankment, as well as the canal along it, worked to separate fresh and sweet water from salt water, maintaining the lagoon’s balance. Additionally, the map depicts the first modification of the Brenta River’s course in 1457 with the creation of a new drainage channel and the diversion of the S. Branson River in order to decrease the river’s water flow. During the same period, some sections of the Brenta mouth were diverted.

APPX. 6 This image/map illustrates the interventions that were done to protect Venice’s lagoon from the landfill process throughout the 16th century. In the first half of the 16th century, the Brenta River was diverted from its original course, following a line parallel to the lagoon’s shoreline through the interception of other existing rivers and canals. The main objective of these alterations was to direct river water flow towards the south so that it did not flow directly into the lagoon. The Bacchiglione River was diverted in order to flow out of the lagoon for the same reason. Together with the Brenta River, the Piave and Sile rivers were considered mostly responsible for the landfill phenomenon. In the early 16th century, a first attempt was made to reduce water flow from the Piave River through an artificial canal (Cava Zuccherina) that flowed out of the lagoon. As a result of the unsatisfactory results, a river diversion was planned and implemented in 1574.

APPX. 7 This image/map illustrates the interventions to protect Venice’s lagoon from the landfill process in the 17th century. Main river diversions occurred in this century: the Brenta River’s diversion through Taglio Novissimo; the Muson River’s diversion, realized by a new artificial canal (Mirano’s diversion) into which other minor rivers had entered, such as Muson Vecchio, Bottenigo, Volpegò, Pionca, Tergola; the Sile River diversion; and an additional diversion of the Piave River. Additionally, at the beginning of the century, Venice worried that the river Po would potentially further modify its course and affect the fragile ecosystem of the lagoon.
even more. Therefore, in agreement with the Papal State, Venice created an artificial diversion, Porto Viro. In this way, the Po River was diverted partially southward towards its delta.

From a research perspective, these maps aim to illustrate the change of the environmental “vocabulary,” that Venice experienced from the 15th century.\(^1\) The landfill process marked a shift from the perspective that water was a symbolic and sacred element for Venice, to it being considered a dangerous threat to its defensive natural boundaries and, consequently, its political and economic structure. This different perspective ushered in the “Age of Water,”\(^2\) marked by the necessity to control and plan these huge and efficient hydraulic interventions through more accurate procedure and calculations. This challenge corresponded to the develop of the hydraulic discipline and the writing of the first scientific treatise on hydraulics by Benedetto Castelli in 1628.

In addition to illustrating these interventions, the thesis aims to demonstrate how Venice’s response to this first environmental emergency was based on the definition of more accurate technical and scientific approaches, while still retaining informal and empirical practices, such as involving citizens, particularly fishermen, in monitoring the level of the water and the health of the lagoon.

2 Ibid., 57.

**Cartographic sources**

In order to illustrate the river diversions a variety of maps and other sources were used, which are listed below in chronological order:

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Luigi D’Alpaos, Fatti e misfatti di idraulica lagunare. La laguna di Venezia dalla diversione dei fiumi alle nuove opere delle bocche di porto. (Venice:
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Venice P1190057. Picture by Juarez Corso.

Introduction


FIG. 6 Original page of Gilbert White’s daily journal, 1813. Gilbert White, *The Natural History and Antiquities of Selborne, in the county of Southampton* (London: Cochrane, 1813), 44.

FIG. 7 Map of Italy by Francesco Rosselli, 1492. Valerio Vladimiro, ed., *L’Italia prima dell’Italia. Carte Geografiche e topografiche dell’Italia dal 1478 al 1861* (Como: Alessandro Dominioni
Chapter 2


FIG. 1b Leon Battista Alberti, water sources search method, 1726.


FIG. 2 Leon Battista Alberti, method used to measure the height of the ground when it is flat and clear, 1726.


FIG. 3 Leon Battista Alberti, method used to measure the height of the ground when it is not flat and clear through the application of the horizon, 1726.


Chapter 3

FIG. 1 Venetian domination from the 16th century.


FIG. 2 Conquest of *Terraferma* in stages.

Chapter 4

FIG. 1 Map of Italy and its hydrographic system in 1853.


FIG. 3 Cristoforo Sabbadino, the lunar diagram, 1550. This drawing explains the motion of the tides inside the lagoon. Cristoforo Sabbadino, “Discorsi del Sabbadino,” in Il sistema della laguna a metà Cinquecento: atti delle celebrazioni del 450° anniversario della morte, ed. Pier Giorgio Tiozzo Gobetto (Venice: Il Leggio Libreria Editrice, 2013), 211.


FIG. 14a Iseppo Paulini, drawing of a valley with lush vegetation in good
condition, 1608.

FIG. 14b Iseppo Paulini, drawing of a valley ravaged by fires, 1608.

Chapter 5

FIG. 1 Benedetto Castelli, picture of two pages from the treatise, *Discourse of the Mensuration of Running Waters*. Here he outlines a schematic representation of an abstract flow of water, 1628.

FIG. 2 Leonardo Da Vinci, water movement, study drawing, 1510.

FIG. 3 Bernardo Zendrini, map of the diversion of tre Brenta River, 1610.
Bernardo Zendrini, *Memorie storiche dello Stato antico e moderno delle lagune di Venezia e di que’ fiumi che restarono divertiti per la conservazione delle medesime* (Padova: Stamperie del Seminario, 1792), Tav. IX.

FIG. 3a Bernardo Zendrini, map of Taglio del Sile. The diversion of the Sile River. 1683.
Bernardo Zendrini, *Memorie storiche dello Stato antico e moderno delle lagune di Venezia e di que’ fiumi che restarono divertiti per la conservazione delle medesime* (Padova: Stamperie del Seminario, 1792), Tav. XXXIII.

FIG. 3b Bernardo Zendrini, map of Taglio del Re. The diversion of the Piave River, 1641.
Bernardo Zendrini, *Memorie storiche dello Stato antico e moderno delle lagune di Venezia e di que’ fiumi che restarono divertiti per la conservazione delle medesime* (Padova: Stamperie del Seminario, 1792), Tav. X.

FIG. 4a Drawing of the evolution of the Po delta. Rotta di Ficarolo, 12th century.
Elaboration by the author of the maps extracted from https://www.bonifica-ferrara.it/servizi/sistema-informativo-territoriale/181-evoluzione-del-terri-


FIG. 6 Athanasius Kircher, Mundus Subterraneus, drawing of the water system on the Earth, 1668. Athanasius Kircher, Mundus Subterraneus (Amsterdam: Amstelodami, 1668), Vol.1, 176-177.

FIG. 7 Giovan Battista Aleotti, the section of an artificial embankment, 1600. Giovan Battista Aleotti, Della scienza et dell’arte del ben regolare le acque, ed. Mario Rossi (Modena: Panini, 2000), 319.

FIG. 8 Giovan Battista Aleotti, artificial embankment reinforced on the outside due to natural erosion, 1600. Giovan Battista Aleotti, Della scienza et dell’arte del ben regolare le acque, ed. Mario Rossi (Modena: Panini, 2000), 320.

FIG. 9 Giovan Battista Aleotti, drawing of the technique to design new embankments, 1600. Giovan Battista Aleotti, Della scienza et dell’arte del ben regolare le acque, ed. Mario Rossi (Modena: Panini, 2000), 322.

FIG. 10 Giovan Battista Aleotti, drawing of vertical timber poles used to slow down the water speed and protect the riverbanks, 1600. Giovan Battista Aleotti, Della scienza et dell’arte del ben regolare le acque,

FIG. 11a Giovan Battista Aleotti, drawing of horizontal bundles to protect the riverbanks, 1600.

FIG. 11b Giovan Battista Aleotti, drawing of horizontal bundles and their location in the river, 1600.

FIG. 12a Giovan Battista Aleotti, drawing of a complex timber structure to support the riverbanks, 1600.

FIG. 12b Giovan Battista Aleotti, drawing of a machine used to drive the poles into the riverbanks, 1600.

FIG. 13 and 13a Giovan Battista Aleotti, drawing of the geometric calculation of water movements and its speed, 1600.

FIG. 14 Giovan Battista Aleotti, drawings of nine different types of hydraulic machines, 1600.

FIG. 15 Francesco di Giorgio Martini, drawings of various types of machines, 1478.

FIG. 16 Giuseppe Ceredi, diagram of cochlea’s handle, 1567.

FIG. 17 Giuseppe Ceredi, drawings depicting two types of cochlea based
on the water level, 1567.

FIG. 18 Giuseppe Ceredi’s, drawing depicting the cochlea being activated by horses, 1567.

FIG. 19 Galileo Galilei, picture of two pages from the treatise *Mechanics*. Drawing of the calculated angle useful for operating the cochlea, 1660.

FIG. 20 Paolino da Venezia, map of Rome, 1321.

FIG. 21 Leon Battista Alberti, map of Rome, 1432.

FIG. 22 Efrosino Della Volpaia, map of Rome and its countryside, 1547.

FIG. 23 Leonardo da Vinci, map of Pontine swamps, 1513.

FIG. 24 Cristoforo Sorte, map of Trevigiano, 1556.
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FIG. 24a Cristoforo Sorte, map of Verona, 1556.
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FIG. 25 Giovan Battista Aleotti, drawing of a method for mapping the sinuous contours of a stretch of river at different scales, 1600.
Giovan Battista Aleotti, Della scienza et dell’arte del ben regolare le acque, ed. by Mario Rossi (Modena: Panini, 2000), 571

FIG. 26 Giovan Battista Aleotti, map of the State of Ferrara, 1603.
Giovan Battista Aleotti, Biblioteca Ariostea library, Ferrara, map XIV-41.

FIG. 27 Bernardino Zendrini, picture of a page of Leggi e fenomeni, regolazioni ed usi delle acque correnti, 1741.

FIG. 28-32 Carlo Bettoni, drawings on the experiments to protect the riverbanks by the use of vegetation, 1782.
Carlo Bettoni, Pensieri sul governo de’ fiumi (Brescia: Pietro vescovi, 1782).

Conclusion

FIG. 1 Chiswick Eyot. View from the riverbank of the Chiswick Eyot during low tide. Picture by Chiara Toscani.

FIG. 2 Chiswick Eyot. Detailed view of the berms created by the willow spiling technique. Picture by Chiara Toscani.

FIG. 3 Chiswick Eyot. View of the island from the riverside. Picture by Chiara Toscani.
Appendix

APPX. 1 Overlap of the phenomena: landfill and submersion process. Diachronic map of barene’s region showing between the 17th and 20th century. Drawing by the author.

APPX.2 Landfill process of barene’s region. Diachronic map showing between the 17th and 20th century.

Drawing by the author.

APPX.3 Irreversible submersion process of barene’s region. Diachronic map showing between the 17th and 20th century.

Drawing by the author.

APPX.4 Barene’s region. Diachronic map showing between the 17th and 20th century.

Drawing by the author.

APPX.5 Map of rivers’ diversions or other water management around the Venice lagoon before the 16th century.

Drawing by the author.

APPX.6 Map of rivers’ diversions or other water management around the Venice lagoon in the 16th century.

Drawing by the author.

APPX.7 Map of rivers’ diversions or other water management around the Venice lagoon after the 17th century.

Drawing by the author.