

finalist

The Machine in the Mountain

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1. The Piave river and its course across the Veneto Region.

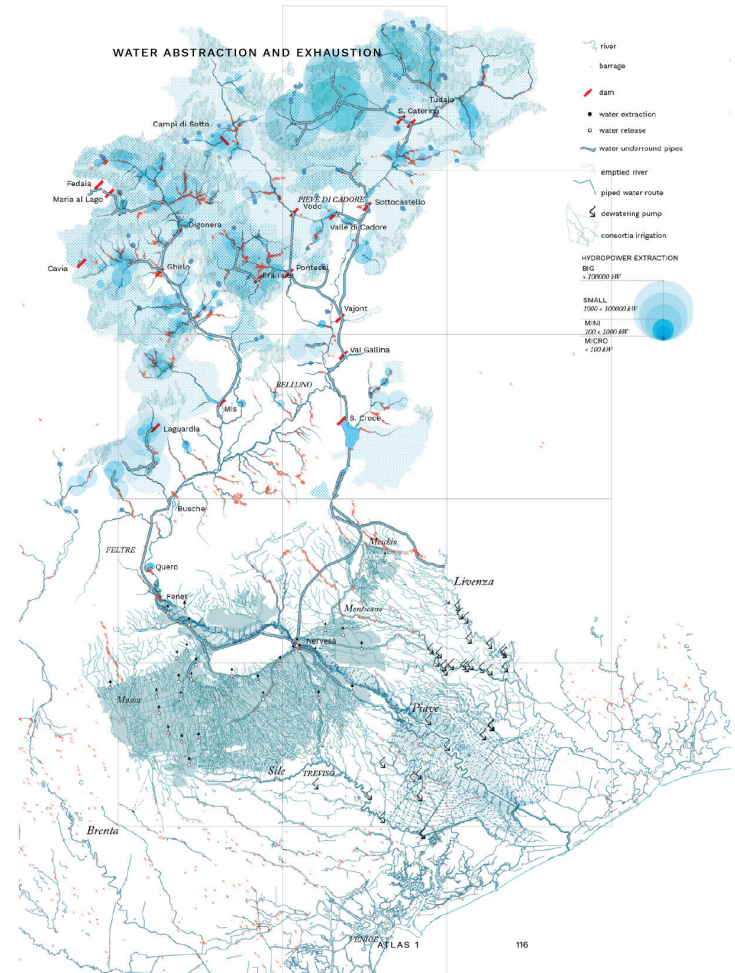


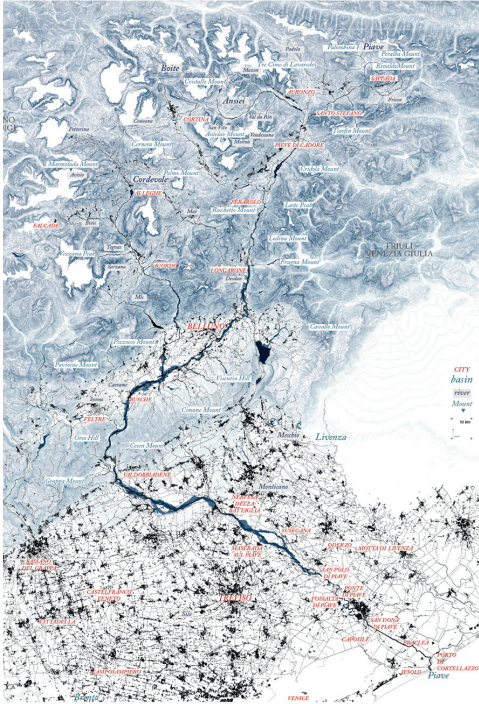
Territories of (hydro)power in the Piave basin

Rather than an immutable historical treasure –as often sold to crowds– Venice is the outcome of intense historical alterations in both of its architecture and landscape. As we all know, the state of apparent equilibrium conveyed by the perpetual water cyclic conditions that pervade the city is the result of vast, radical, transcalar, expensive interventions operated across centuries. All the efforts sought to maintain what is actually an artificial condition of nature, a man-made environment. The decisive operations that contributed to the state of nature –as we perceived it today– occurred before the end of the nineteenth century rather than in the following one. The main acts bound to this exceptional condition can be chronologically listed in three territorial interventions: the extensive diversions of Piave, Sile, and Brenta rivers¹, the sea banks constructions, and the alterations made to the lagoon fringes. Nevertheless, the past one hundred years have seen these vast modifications to the waterscape being subjected to the acceleration of additional transformations dictated by the necessity to overcome the socio-economic stagnation of the post-war era and –more recently– by the urgency to confront the exacerbating climate condition.

More broadly, the nineteenth century initiated two groups of events of different scales: the age of the machine, implying a radical development, and the market system, an initial adaptation to that same development. The use of the machine involved the first use of energy other than man and animal one, transforming the

2. Water Exploitation in the Piave basin, Veneto Region. Map showing paths of water diversion for hydro-power production and fields' irrigation: through geo-spatial simulations, the map explores, the water accumulation, deviation and exhaustion dynamics.





meaning of our contact with nature (Polanyi 1983). As matter of fact, the construction of the hydro-power machine in the mountains of the north Italian territories signified *de facto* a radical alteration of nature into a mechanized system of production. In Hawthorne’s experience in the landscapes of Sleepy Hollow –as described by Leo Marx (1964)– the machine is made to appear with startling suddenness, emitting a sound that reverberates endlessly in American literature (L. Marx 1964, 15–17). Similarly, this event occurs across the Italian mountains: suddenly the electric sound of power generation vibrates in the air in the encounter of trusses, across the mains over passing over our heads, or taking the pathway of a dam crown. The “symbolic power of the single event” manifests when we look for and approach the machinic elements. They are hidden and dislocated across the mountain landscape, almost silent, unmovable gigantic pieces which seem to belong to the territory since their conception. The mountain reveals the magnitude of its control over nature only when one gets deep into its caves: it is the turbine hall that tells it all.

The unprecedented transformation of science and technology occurred towards the nineteenth mid-century and originated new

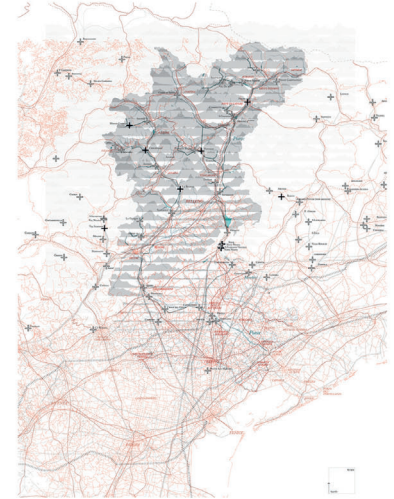
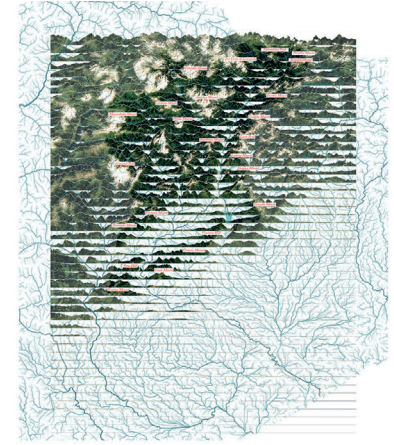
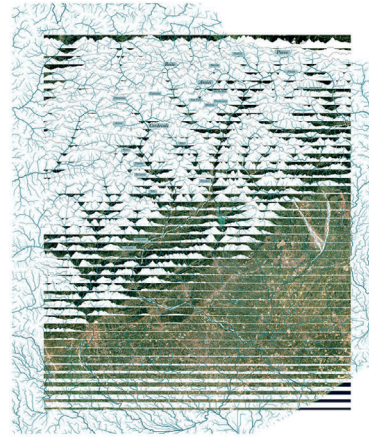
paths of choices in the order of human and non-human collective destinies, where main electricity played a crucial decisive role. The alterations to both the environment and human domestic life made possible in the Machine Age were enacted by new possibilities to access almost unlimited resources and supplies. They became so entrenched in our daily lives that we entered a Second Machine Age, the age of power and the reduction of machines to a human scale (Banham 1960). Considering the river’s mechanical transcalar applications to power, we start questioning thus how, and by whom, nature has become increasingly operationalized. Von foster clarified that “a machine is to be understood as a conceptual *tool* (an abstract entity that is constructed from conceptual components that function as gears)” and that when it is characterised by an invariable one-to-one relationship between its ‘input’ (stimulus, cause) and its ‘output’ (response, effect), what we have is a trivial machine (H Von Foerster 1984; 2010). Looking at the trivial machine deployed in the mountain, at the complex multi-layered systems of water it has laid, following the components of its current machinic functioning through less overt ways of production, we start understanding the uneven power relations through which the

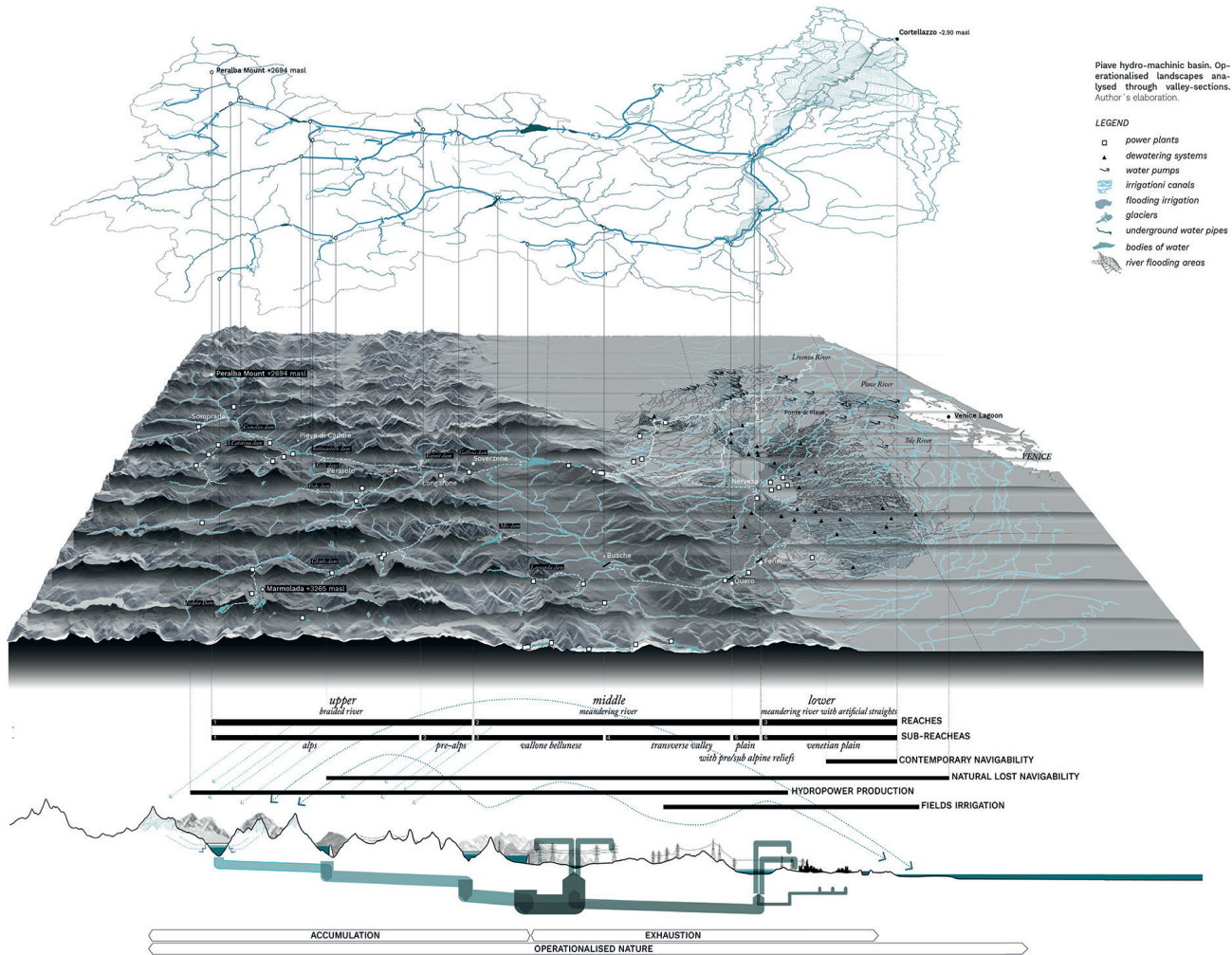
3. The river course sustaining the urbanisation of the Veneto high and low plains.

socio-metabolic transformations take place in the formation of the urban environment.

The thesis sustains the relevancy of looking at questions from different scales. Throughout the entire work, the research moves across a multiplicity of scales intending to explore dynamics at their relevant frames of representation. It argues for an analysis which is constitutive of cities and their more-than-urban geographies, in order to address both the specificity of conflicts at the local scales and the larger web of political, economic, and environmental processes in the broader one. By bringing upfront the socio-ecological rationalities of the Piave operational landscape the thesis uncovers fragmented understandings of the basin (similarly to the archive is fragmented) which prevents an encompassing understanding of the machine's ability in forging the territorial palimpsest. In the recognition of the absence of a comprehensive view lies the stance that partial readings, far from being the result of scientific or methodological mistakes, belong to specifically interested perspectives and agencies that are associated with the ways in which capital

4. Cartographical and hydrological analysis of the mountain-plain condition (upper maps), water abstraction and power production and distribution (lower maps). Atlas excerpt.





5. Piave Capitalocene River. X-ray bird-view sectional cartography of the Piave hydro-machinic basin through a perspective valley-section.

makes use of the river as if it was an infinite resource. Here the thesis shows that the question therefore would not revolve around the possibility to form a totalizing model of management of the river —which would be ultimately something impossible to build—, but on the understanding of what is behind each of these agencies and partial views.

As a result, the research attempts to uncover these praxes and reveal the anatomy of the Piave basin challenging modes of representation which can capture the region's multi-layered complexities entangled along the river. Through drawings, images, diagrams, and cartography the thesis makes the attempt to explore alternative representations as a way to define future trajectories. It makes use of photographs to voice out explicitly how the machine is naturalized into the landscape and above all different geospatial analysis and design tools to challenge the territory's usual description and provide ways to understand dynamics, negotiate conflicts or suggest alternative visions.

Objective and research questions

Stemming from the materiality of water, its role and its value, a series of questions drive the research. It asks who's the power to accumulate it, to use and distribute it within a complex overlapping fragmented group of institutional bodies? Where do we draw the beneficial threshold of great works' acceptance, with their considerable landscape alterations? Where and how the system is unresponsive or unproductive? Is it possible to imagine a structural modification of the machine which implies the fragmentation into individual collaborating sub-systems, therefore addressing the site-specific condition of their environmental and geospatial contexts? What are otherwise the consequential

ecological costs of consistent use of the same mechanism?

Research methodology

Water is arguably the most intersectional and interdisciplinary among all-natural resources. Exploring the rationalities through which water is abstracted, accumulated, and commodified for the production of energy across a transept of the Italian Veneto region, this work seeks an understanding of the role of water apparatus within the urbanisation processes, and how its embedded dynamics of production —would they be energetic or of agriculture— are closely entangled, and consequentially dependent upon, the ecologies of specific spaces, often seemingly disconnected or remote. In the current frame of increasingly worsen climate conditions, this work attempts to understand and question the social, political, institutional, and ecological dynamics that the machine in the mountain entails across the territory.

The dissertation, therefore, although dealing with the history of hydropower technology, is not intended as a history of the machines from an engineering point of view, nor it claims to tackle the territory in its entirety and full complexity. Rather, concerned with the social-spatial context of the technology, it looks at how, through the construction of a series of dams and locks and associated engineering works, those in control of the river interrupted and channelled its flow to make it both an instrument for the exploitation of the natural world and a part of the region urbanisation. It makes, therefore, use of *hydropower* as the lens through which it is possible to grasp the complexities of the 'operationalization' of the territory across spatial and temporal scales. In doing so, the thesis argues that the disciplining of the Piave is emblematic of the way in which people, politics, and ecology have come to be bound together during the era of modernity to produce and enforce

the disciplined nature that is characteristic of the contemporary territory. The research makes use of a theoretical framework composed of a wide range of disciplines, ranging from urban and landscape studies to urban political ecology (UPE), science technology and society studies (STS), environmental history, cultural geography, and geoscience, as well as hydraulics and engineering.

The use of UPE's conceptual framework comes into help in trying to answer these questions, as a lens through which showing how the socio-natural metabolic flows originating 'elsewhere', in the non-urban space, produce cities as much as their specific socio-political contexts (Connolly, 2019). It provides a useful conceptual methodology for analysing processes surrounding the politics of distribution and the abstraction of water (Menga & Swyngedouw, 2018; Peet & Watts, 2004; E. Swyngedouw, 1997). The work of urban political ecologists, focusing on elements of nature which permeate cities shows —while perhaps focused on a particular urban site, as critically observed by Angelo, Wachsmuth and Connolly— that the socio-natural flows and interactions taking place within the city are not bounded beyond the urban constructed inhabited space

(Angelo & Wachsmuth, 2014; Connolly, 2019), helping to conceptualise the end of the urban-rural divide. Engagements of this methodology with landscape urbanism research praxis provide a productive method to frame and conceptualise extensive forms of urbanization through the focus on critical landscapes. This draws from the understanding of landscape as a “machinic model” which requires a ‘transdisciplinary praxis’ (Spencer, 2012) and acknowledges critical agency as opposed to —as Grahame Shane argues (2003)— ‘flexible’, ‘sustainable’ or ‘bottom-up’ approaches in urban design. It elaborates on the concept of a produced, assembled, networked, or cyborg-ian nature as an internal-versus-external component of society in deep contact with capital, challenging the superficial idea of ‘sustainability’ and ‘naturalism’ inherent in many architectures and planning of the late 1900s and early 2000s especially (Gissen, 2019; Spencer, 2020). The methodological approach to the *territory as a process* is useful for the examination of dependencies, responsibilities and inequalities of everyday diverse practices of urban phenomena and their more-than-urban connections. The understanding of their infrastructural assembly as supporting apparatuses

through which material, social and economic flows foster capitalism's dynamics in the globalised territory (Castro, Ramirez, Rico, & Spencer, 2012), is unfolded through the tracing of different related sites where flows are *de facto* captured, accumulated, exhausted or distributed. The research has therefore made the first ever attempt to analyse —through advanced geospatial simulations— how and where water is abstracted or accumulated, its deviations through artificial paths as well as its actual flows and natural accumulation areas according to the geomorphology of the river basin. This analysis has been put in relation to the mapping of the energetic apparatuses and their network of distribution across the landscape into urbanised areas.

Tools

Although Piave's story has been documented across a long array of different publications, very few have dealt with the case of Piave in an encompassing way from the perspective of landscape and urbanism studies in conjunction with those of urban political ecology. Leveraging on a combined and mutually beneficial approach, this work attempts to understand the urbanisation of the diffused city and its more-than-urban geography from the landscape. To this end,

the thesis makes the attempt to synthesize and interpret the research in multiple ways and through the use of different analytical means by producing texts, drawings, maps and diagrams. The thesis makes use of *sites survey*, *photography*, *archival research*, and *mapping*. A long series of geospatial datasets have been explored, juxtaposed, compared, and unified. As a result, the research has made the essential effort to reassemble geospatial information of different subjects in relation to the territory and across different scales. Institutional datasets were collected and compared, both at the scale of the river basin and at the Alpine and European ones. This work in fact highlights the complexities of formulating a comprehensive documentation of the river geospatial information and obtaining a coherent body of knowledge.

The thesis is structured into five parts: besides the introduction and the argumentative conclusive chapter titled *Reset*, which contains the research conclusions, three main chapters divide the thesis.

Across the work, the aforementioned research tools built up four appendixes of three types: a photo essay, an archival section and the atlas. They are employed across the work as *intermezzos* which help to convey the thesis' ways of seeing the river through different perspectives. The initial photo-essay collects a linear journey made along the river course, and documents the conditions of the riparian landscape, whilst the archival section declares the elements through which certain praxes are employed by exposing crucial parts of the machine construction any longer visible. Materials of both these two appendixes are also used throughout the thesis to sustain differently each chapter's arguments.

Whilst the entire work moves across different parts of the region, following and returning upstream and downstream the river on multiple occasions, the mapping reconstruction and geospatial analyses compose and organise an Atlas of cartographies covering scales of the Piave basin, the Eastern Alps Basin, the Alpine

Region, and Europe. As a result, the Atlas frames the questions of research whilst projecting visions which underline the relevance to look at the river and the more-than-urban geographies from a multiplicity of scales. Cartographies composing the atlases bring unseen images of the territory, like with the analysis of sub-hydro basins exploitation and the balance between water use and energetic production (p. 108 of the thesis document), ultimately framing the reciprocal relationship of improvement or exploitation between the mountain and the plain. Acknowledging the challenges of exploring and describing conditions which carry both spatial and temporal scales, the research ultimately attempts to provide different ways of seeing the river.

A system in crisis

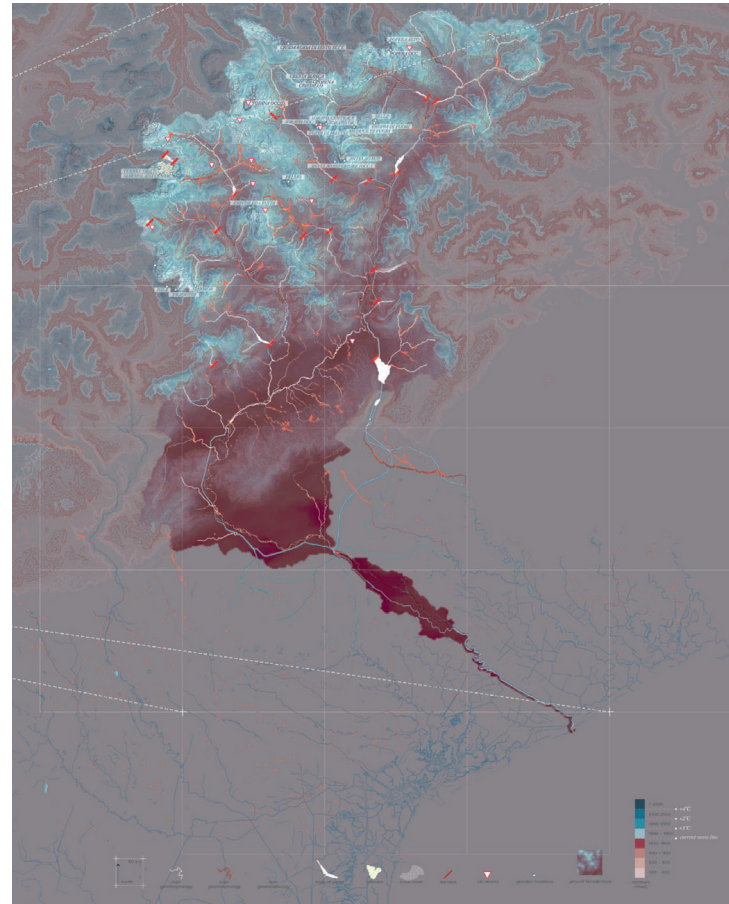
The first chapter explores the condition of the current climate regime by analysing how processes of accumulation, exploitation and exhaustion of natural capital have contributed to the 'great acceleration'. Through the Piave and some of its transects, it argues how the alpine territory is a litmus test for the current warming condition exploring how extreme events, ecological emergencies and counteractive approaches are particularly challenging in

the Alps area. In this context, the Piave, embedding a palimpsest of the Veneto region, is exemplary of the capital use of nature, as well as the testimony of its crisis as much as the ongoing environmental one. The chapter argues that the conceptualisation of the Piave as a Capitalocene river requires a definition of different modes of representation of the territory able to transcend unproductive dichotomies of society/nature and urban/rural environments and capture the multi-layered transcultural complexities of the region entangled along the river. The conceptualisation of Piave as a Capitalocene territory, represented (in chapter 1, pp. 88-89 of the thesis document, here figure 5) through an x-ray bird view across the basin, challenges the usual projection of the region as well as the valley-section tool by denouncing that links and relations across the landscape are not just linearly up or downstream the river course, but multidirectional and multi-layered.

The sectional photo essay of the Piave at 10 km intervals describes a physical journey taken along the river across the years of research. Conceived initially as a linear trip from south to north, in the attempt to follow upstream, the course of the river from the sea to the dolomite peaks, it has ultimately been experienced as an array of ritual seasonal expeditions which allowed to discern its geomorphology in its cyclical dynamics. The essay demonstrates inescapably that we only detect the machine across the landscape when its main hinges get markedly manifested through major infrastructures, yet it remains everlastingly concealed in the underground pipes, buried foundations, and in-cave powerhouses.

MACHINIC LANDSCAPE

The second chapter represents the main body of work on the Piave River and is divided into two sub-chapters. It opens with the first part of the thesis, a Semiotic Atlas of the Piave hydraulic Landscape. It



6. The warming condition of the territory in the Piave basin: glaciers loss, exposed skiing infrastructures and the moving upwards of the snowline accordingly to different scenarios.

7. Piave Accumulation-Exhaustion North-South Trajectory.

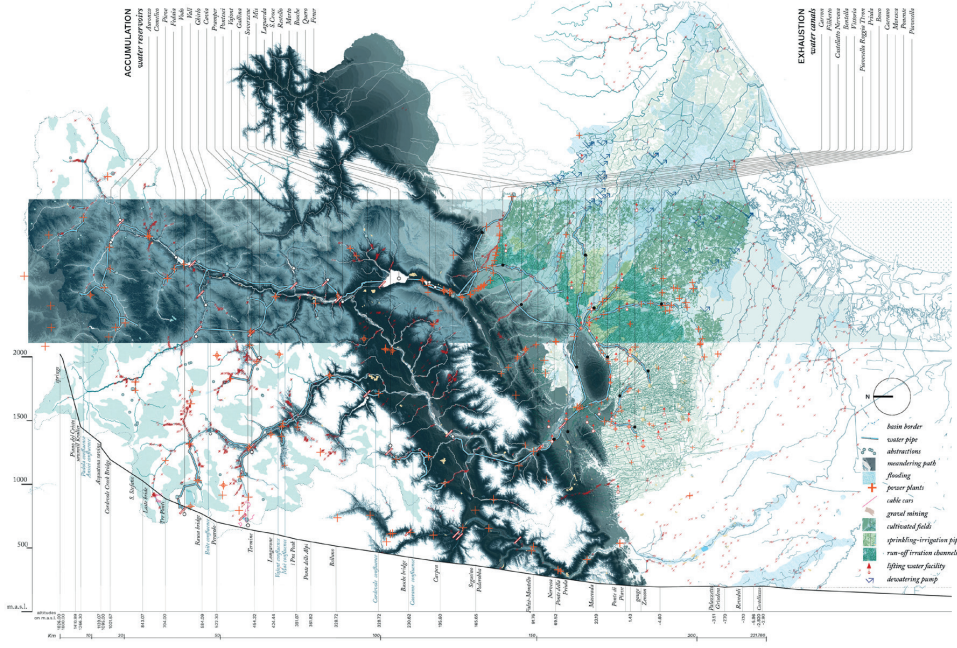
analyses the river hydrological basin scale, exploring by categories of representation all the constitutive parts of the water apparatus. As a result, the collection of maps which follow compose a semiotic atlas of the Piave hydraulic landscape which describes both well-known infrastructures, such as the main devices deployed along the river (such as dams, barrages, sluices, power plants, mains, and pipes), as well as

proposing a series of innovating analysis of the basin. Geo-spatial modelling of elaborated data innovatively exposes how the basin's thick deposit of water resources is exploited, which are the main areas of water abstraction, highlighting geographies that contribute majorly to energy production or sustain plain cultivation praxes. Mappings identify for the first time an up-to-date description of the water abstractions

and use and diversions of water, both in the mountain and plain environments. The Atlas, further, re-tracing spatial relationships across the region, exposes their tensions and contradictions, in this way informing the selection of the succeeding syntagms of the machinic functioning.

A promethean hydroelectric laboratory

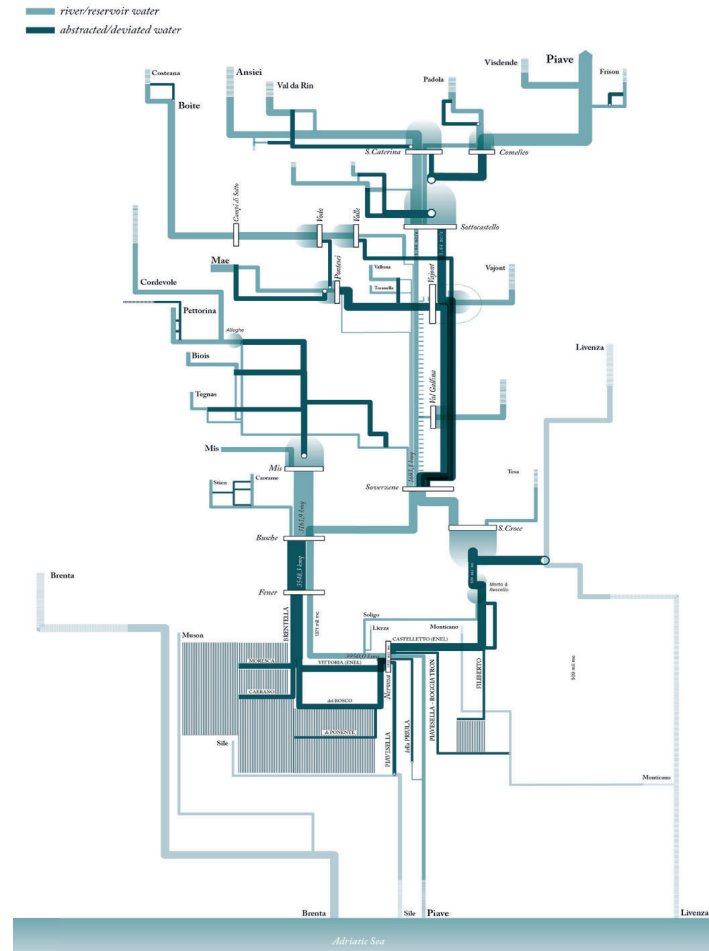
The first sub-chapter unpacks the twentieth-century cultural, legal, political, and managerial praxes which, by turning the river into an operationalised techno-nature, exploited nature for national development as much as for political propaganda. Through the analysis of geographic-scale engineering interventions that characterized the policies of the Fascist government and its advocacy of an idea of nature amelioration for man's benefit —endorsed by an array of newly proclaimed laws—, the first part describes the role of engineering, dams, and electricity within the mountain project, exploring the concepts of autarchy and self-sufficiency through nature exploitation and capitalists' attitudes. Highlighting the reciprocal relationships between the mountains and the lagoon which the river sustains, and the one between nature exploitation (hydropower production) and capital production (Porto Marghera), which the



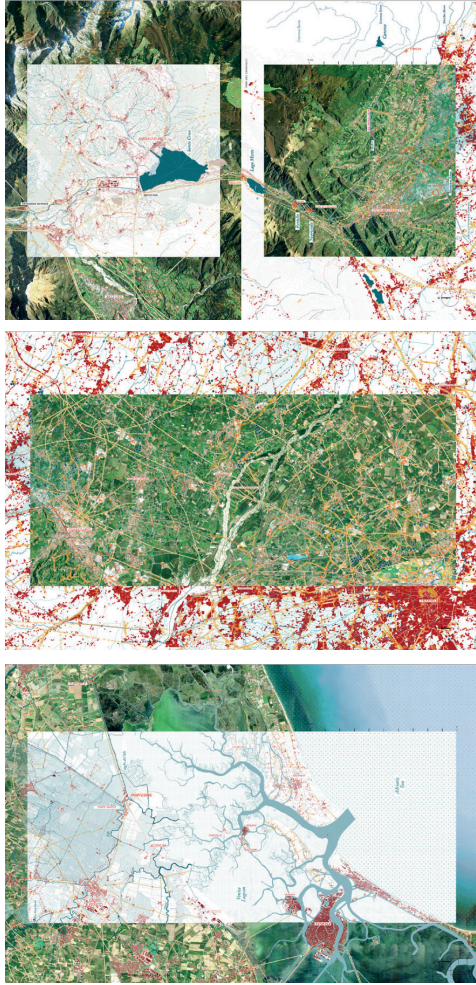
river provides, it argues that the results of modern investment in fixed capital works (such as dams and weirs) and the re-structuring of territories through water flows, was such as to begin to make of the river a work of metabolized 'second nature'. This part closes with a collection of unpublished visual materials that aims at providing a meaningful sample of the rationalities embedded across the Piave territory. In a way parallelly following the previous photo-essay, it oppositely demonstrates de facto what the first cannot: the buried, hidden, or lost pieces of the machine in the mountain. The unaccomplished selection is ultimately arbitrary and partial but exposes manifestly the nature of the machine territorial syntagms are made.

Territorial syntagms of an organic-mechanical state

The second part of the chapter explores a second phase in the story of the Piave operational nature (which was initiated in the 1960s), exploring how legacies and interdependencies of systems, deployed across both the mountain and the plain, are interlaced and currently dictating uses and directions of development of both the rural and the urban environments. It sustains the hypothesis that the territorial machine in place has not ceased to undergo changes but has actually been operationalised and expanded further to post-modern components which both intensify its activity and saturate the riparian landscape. An example is the machinic diagram of the valley (in chapter 2, p. 258 of the thesis document, here figure 9) which attempts to expose water exploitation by transposing existing data on the machine functioning, in order to visualise the true course of water deviated from the river and the entanglements of its technological apparatus with other basins and systems of production. This chapter further argues that the machine in place requires an expeditious reassessment of its overall functioning in relation to the use of territorial resources, questioning



9. Machinic functioning of the Piave, extraction and distribution of water.



the capacity to provide and sustain current demands within the frame of the current climate condition. Focusing on some of the syntagms of the organic-mechanical behaviour of the river, through cartographical and diagrammatical explorations, it analyses a north-south trajectory from the mountain to the sea, which —diverting from the original river course— dissects the territorial socio-spatial formations dictated by praxes of production sustained by the water apparatus. This territorial strip, diverting from the original river course, offers significant samplings of the water apparatus enabling praxes of different systems of production. As a result, it explores the dynamics and conflicts which have consolidated in time as well as those established in the recent period. The analysis aims at exposing how they continue to intertwine with the modern machine by developing dependent sub-systems in contrast with the territorial condition of hydrogeological risk, in the current condition of climate change.

Relations between

The third chapter explores the dynamics of hydropower production in larger contexts. Looking at attitudes and cases beyond the European boundaries it looks at the

10. Strip zoom ins. Cartographical analysis along the strip of water and power infrastructures

ongoing debates and conflicts emerging around nature at work. This part makes use of experiences of study abroad made during the last few years to understand and document different approaches. It also situates water exploitation in the Piave within the larger context of the Alps and the European territories and analyses main policies and plans that aim to address issues of climate change, resource scarcity and power production within proposed ongoing programmes or policies. The framing of Piave dynamics within larger scales of the Alpine region (pp. 332-342 of the thesis document) and the European territory (pp. 344-371 of the thesis document) in the Pan-European Atlas of Hydrogeographies of Power, has the potential to provide the recognition of recurring dynamics at the large scale, as well as the formation of different perspectives and visions towards the condition of the Alps space and European river landscapes as thick productive operationalised terrains of capital and power.

Reset

As the introduction of this work argued, to understand the state of this system, to see if and how it 'progresses', or whether it fails, in constructing inhabitable and sustainable

environments, means to come to terms with the river as a whole, and to do so, we have to come to terms with the palimpsest of matters, values, theories, and rationalities laid across the larger territory implied. The understanding of the machinic condition of the river implies a deconstruction of its second nature, and in this perspective, it implies a deconstruction of modernity. This is here intended as the disassemble of what Jurgen Habermas (1980) called *the project of modernity*, that scientific domination of nature which —exercised through an extraordinary intellectual effort during the Enlightenment—, brought “human emancipation [...] freedom from scarcity, want, and the arbitrariness of natural calamity” (Harvey 1989, 12). The commodification of nature since the construction of the *project of the mountains* and *bonifica* has been mediated through productive processes that, from a sociological perspective, have blurred more than declared their spatial practices. This section of the thesis argues that true enough, modernity constantly sets the scene for its downfall, but modernization as a social, economic, and cultural process is not over yet. It reflects on the possibility to deconstruct modernity and the impracticality of obtaining comprehensive knowledge that

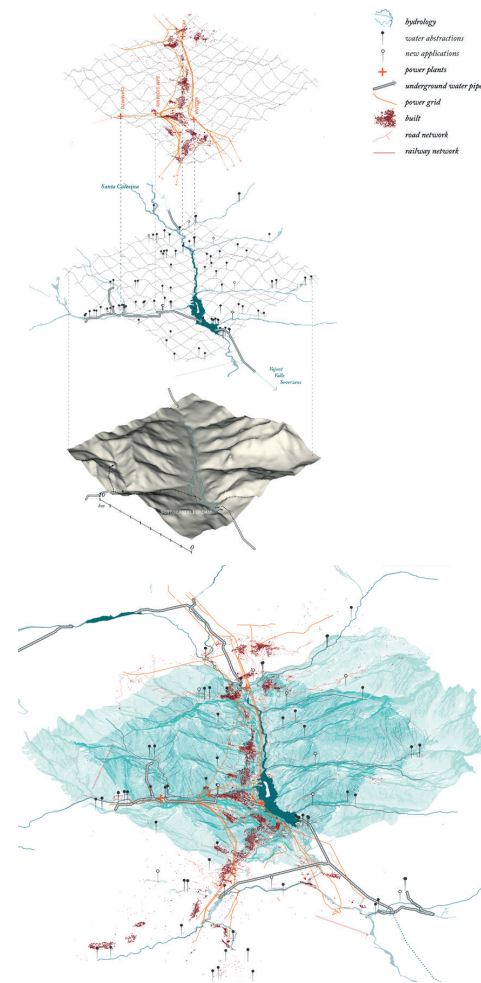
characterizes the current postmodernist condition of fragmentation. Further, on the necessary attempt to understand and address territorial practices as a way to reconstitute knowledge and alternative forms of power.

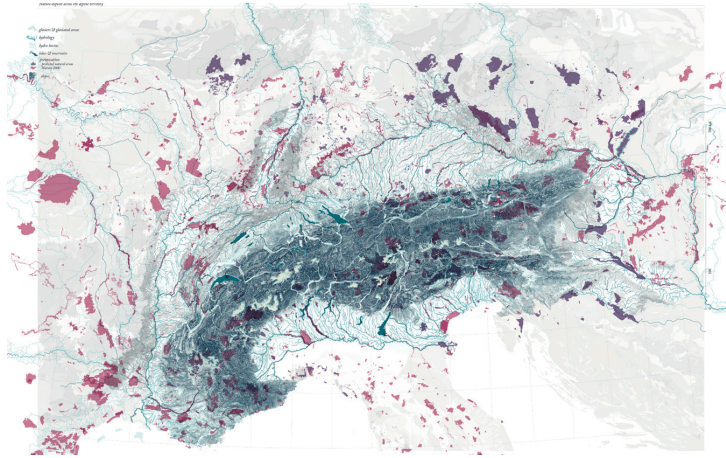
Pondering upon the necessity to produce ‘non-trivial machines’, it sustains that if we accept the extraordinary variability of nature, we can therefore attempt to envision different states of the machine, as a description and definition of what kind of spaces we wish to inhabit. Paraphrasing Aldo Leopold’s classic injunction to “think like a mountain” (Leopold 1949), as to get closer to the land, it exhorts to move beyond consolidated systems of production to activate new practices and behaviours, where reversibility and flexibility would have to come into play.

Conclusions

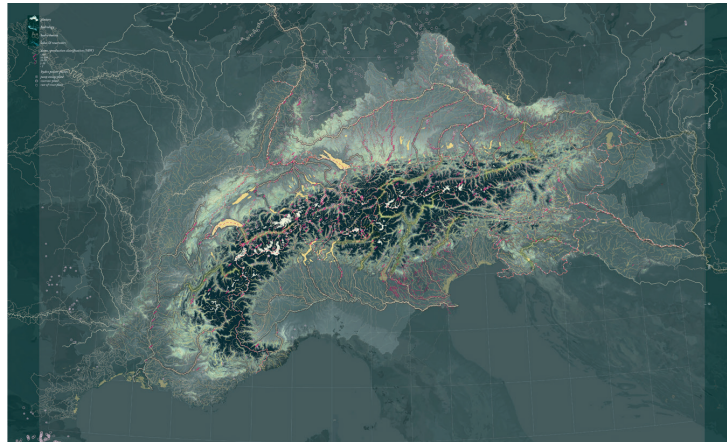
Through the lens of hydropower, the research shows that along the Piave exists a long array of narratives, visions, and arguments which are political and material at the same time. All actors that in different ways are involved in the exploitative uses of its course, claiming their part, commodify

11. Axonometric analysis of the territory surrounding Pieve di Cadore reservoir and dam.





13. The Alps Spatial Capital.



12. The Alps Machinic Landscape.

the river in an interdependent chain of processes. The thesis thus provides evidence of how physical modifications to the river, praxes of production, inhabitation, and use of its spaces and materiality — to sustain electricity, fields irrigation, gravel extraction, or construct higher embankments as flooding prevention measures —, together with policies, laws, plans, tourism economy and the idea of green energies, are all political technologies of this territory. With their own strategies, methods, and approaches toward the river, they imply specific doings of power, which results in specific social and material consequences. Demonstrating their interdependent relationships, the research attests to how the river mechanization is fundamental in sustaining urbanisation praxes.

Although the thesis does not take a resolute position or identify machinic syntagms to be neglected, demolished, maintained, or improved, nor does it indicate alternative practices to be implemented at the small or large scales —laying out the limits and blind spots of this work—, it does trace trajectories of thought, analysis, and development. In doing so, it makes evident reciprocal relations of material and capital fluxes, how decision-making processes behind water excessive abstraction methods and their necessity to be reassessed towards more coherent and sustainable praxes, and ultimately the possibility to shift roles of certain parts of the machine in the light of their effective productivity, current uses and values associated with the riparian landscape. Within the framework of the ongoing climate regime, its growing dynamics of water scarcity (dictated by rising temperatures and loss of glaciers) and extreme events (always more exemplified by intense sudden amounts of water lashing the territory), it emerges how the mountain environment is always more incapable of responding to raising demands of both energy production and irrigation, whilst the plain needs a comprehensive reassessment of the waterscape which

moves beyond the juridical boundaries of management bodies. As a result, the definition of a different politics of water which both identify preserving measures of its resource as well as effective hydraulic defense is paramount. Incontrovertible challenges, which stem from the materiality of water in the current condition, are problems of future accessibility (by the definition of what and how water needs to be abstracted and stocked), whilst simultaneously defining places or methods to cope with flooding events. These issues are ultimately questions of space, its modification, and scale. They imply the definition of effective politics of territorial planning carried out through radical decisions and radical design choices — the grounds from which the research should progress. The externalisations of these urgencies, prolonged since the end of the 1960s, have evolved into a gradual disengagement of socio-political praxes towards the soil condition and a progressive detachment of planning methodologies from the design of the territory. It emerges how from an overlong lack of response towards these issues, always more conflicts will emerge around water, its accessibility, scarcity, or risk, eventually resulting in unproductive productive soils, failures, and losses for

both ecosystems and inhabited territories, and ultimately further mechanisation. Ultimately, this work is not intended as a complete taxonomic survey. By bringing together territorial dynamics, stories, and historical elements, and by identifying the threads that interconnect them, whether apparently or less-overtly exposed, — not following a strict methodological framework— it attempts to provide an interdisciplinary methodology to approach the territory. Questioning and exploring the spatial, political, and ecological dynamics that the *machine* in the mountain entails across the territory, it aims at contributing to establishing a productive framework to analyse it, whilst providing clues of their spatial implications at different scales. In the midst of the ongoing multiplicity of crises, the thesis argues for a widening need to describe the machinic territory as a way through which to envision future coexisting strategies to inhabit the territory. To this end, the thesis claims cartography, and the design of territory (both considered as surveying and projecting) as instruments with the potential to expose and mediate among managerial, surveyance and legal practices and fields. As a result, the research shows the relevance to transcend binaries of society/nature and urban/rural

environments in order to explore the socio-ecological complexities of ‘second-natures’. Finally, the research argues for a multidisciplinary approach that brings together urban and landscape studies with urban political ecology, the science of technology, environmental and society studies, from which inform alternative perspectives beyond the engineering paradigm, and experimental representation means in order to extend the understanding of the multiplicity of processes sustaining urbanisation. By shifting urbanism focus into large ‘operationalised landscapes’, through the lens of landscape as a ‘way of seeing’, working, and reconstituting knowledge, this work aims at empowering territorial research as a design tool. The combined trajectories attempted with this approach give the opportunity to identify hierarchies of objects and praxes, understand structural and non-structural actions, levels of indispensability or different degrees of flexibility, and give hints towards the prelude of a plan, where we can start envisioning ‘internal states’ of the machine.

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