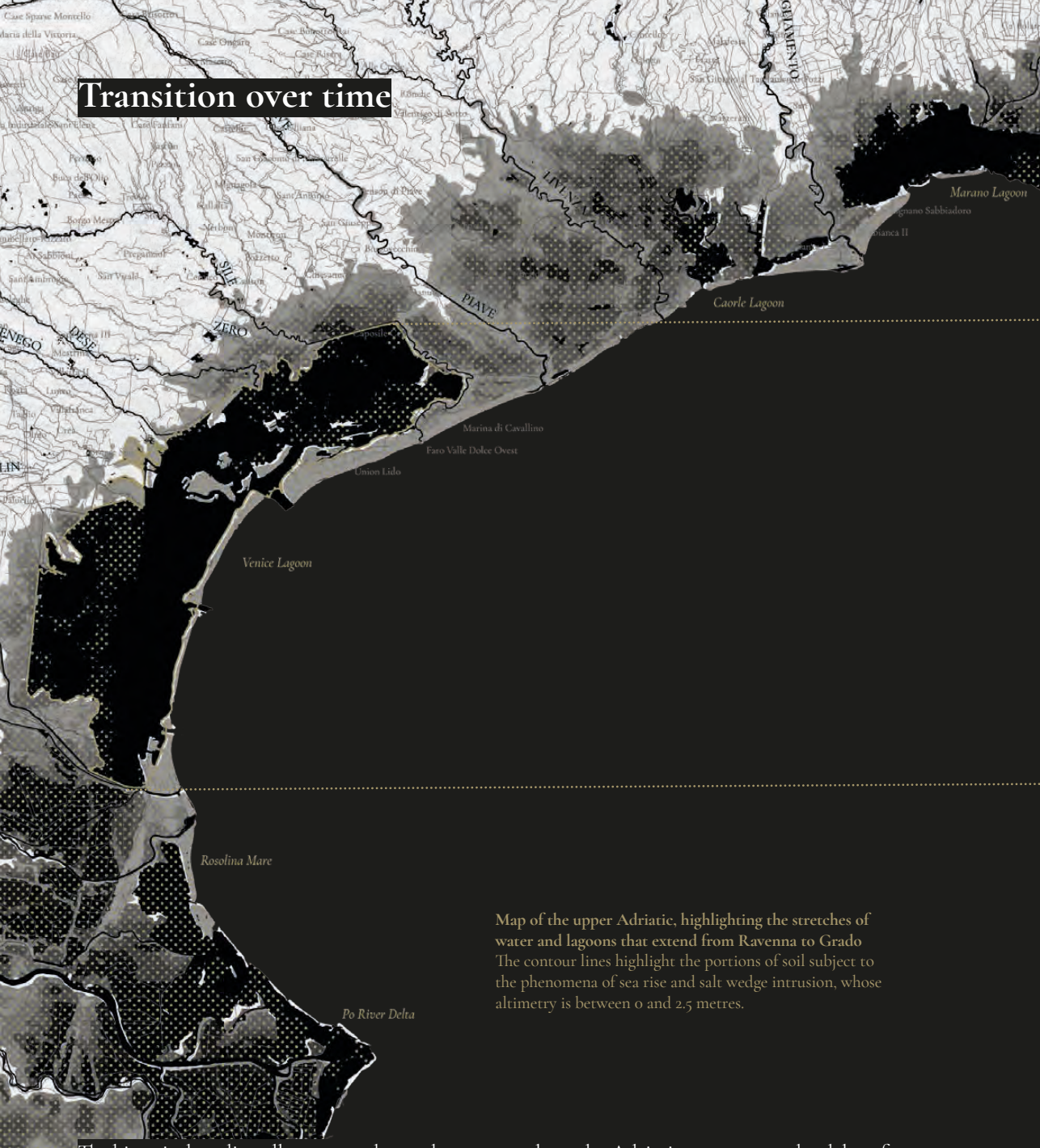
If on the one hand the closure of the lake of Venice has allowed us to reflect on the lagoon as an artificial space, defined and regulated incessantly by man, on the other hand the prospect of the expansion of the water surfaces beyond the limits of the current *conterminazione lagunare* gives us the opportunity to reflect on the lagoon as an amphibious space, in perennial and irreducible transformation. The lagoon is a transitional space that is expressed in historical, morphological, hydrodynamic and biological terms.

Transition over time



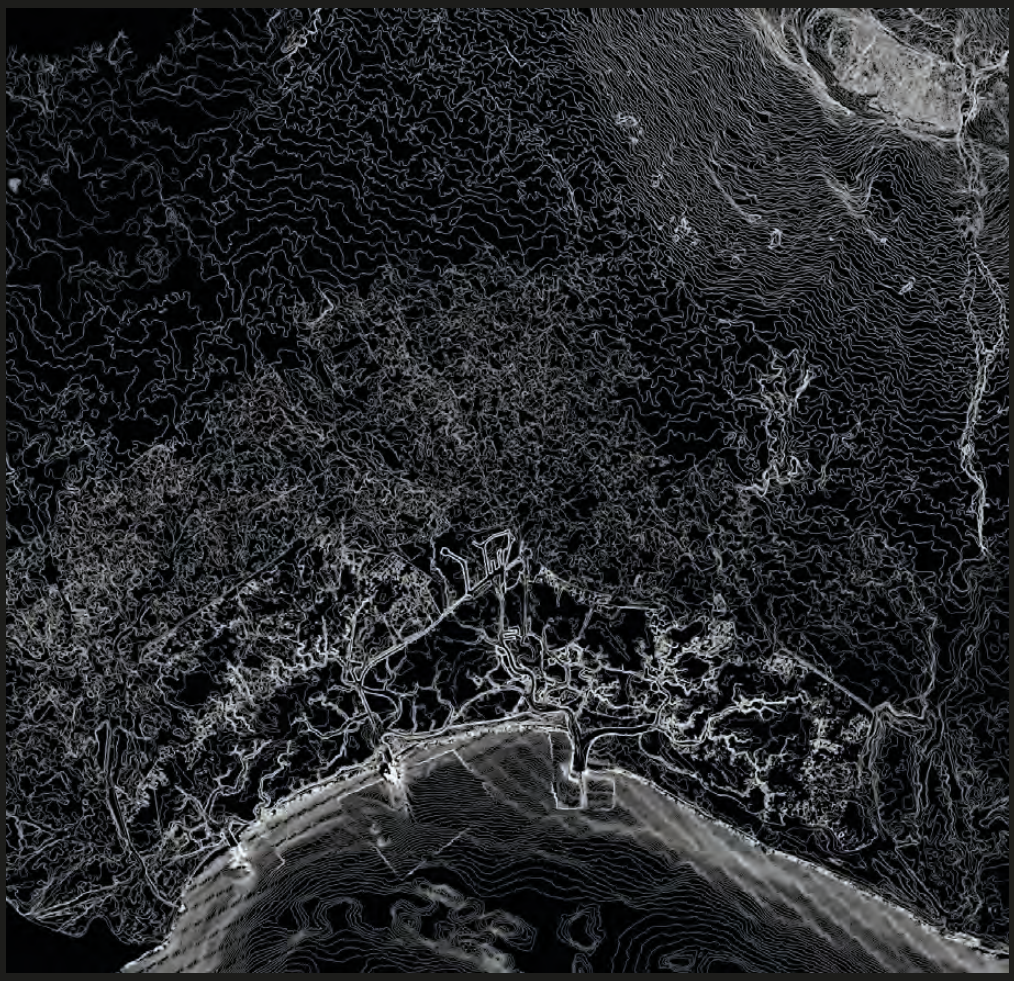
Map of the upper Adriatic, highlighting the stretches of water and lagoons that extend from Ravenna to Grado
The contour lines highlight the portions of soil subject to the phenomena of sea rise and salt wedge intrusion, whose altimetry is between 0 and 2.5 metres.

The historical reading allows us to observe how the space of the upper Adriatic, and with it the Venice lagoon, has always been an amphibious one. As evidence of this and of the ancient lagoons that were distributed throughout the northern coast of the Adriatic Sea, today remain the stretches of water that from Ravenna, along the Adriatic coast up to the delta of the Po, extend to the lagoon of Venice and the lagoon of Marano and Grado. Miozzi's reconstruction of the state of the Venice lagoon in Roman times and around the year 1000 (Miozzi, 1969, pp. 48-64) tells us of a lagoon that expanded beyond its current limits to the south-

Redesign of the map of the Venice lagoon in the year 1000 (from Miozzi, 1969)
The map highlights the stretches of water to the east and west of the current *conterminazione lagunare*. The current morphology of the lagoon is overlaid in gold.

west up to, incorporating pieces of countryside that before the deviation of the Brenta river and until the end of the 16th century were part of the Brondolo lagoon; to the north-east up to the systems of lagoons and marshes that extended beyond the mouth of the Piave and as far as the Livenza river. These maps show how the spaces of the cultivated countryside overlooking the lagoon, mostly the result of the reclamation that took place in the last five-six centuries, are actually territories whose nature was –and will always be– in transition.

Ground transition

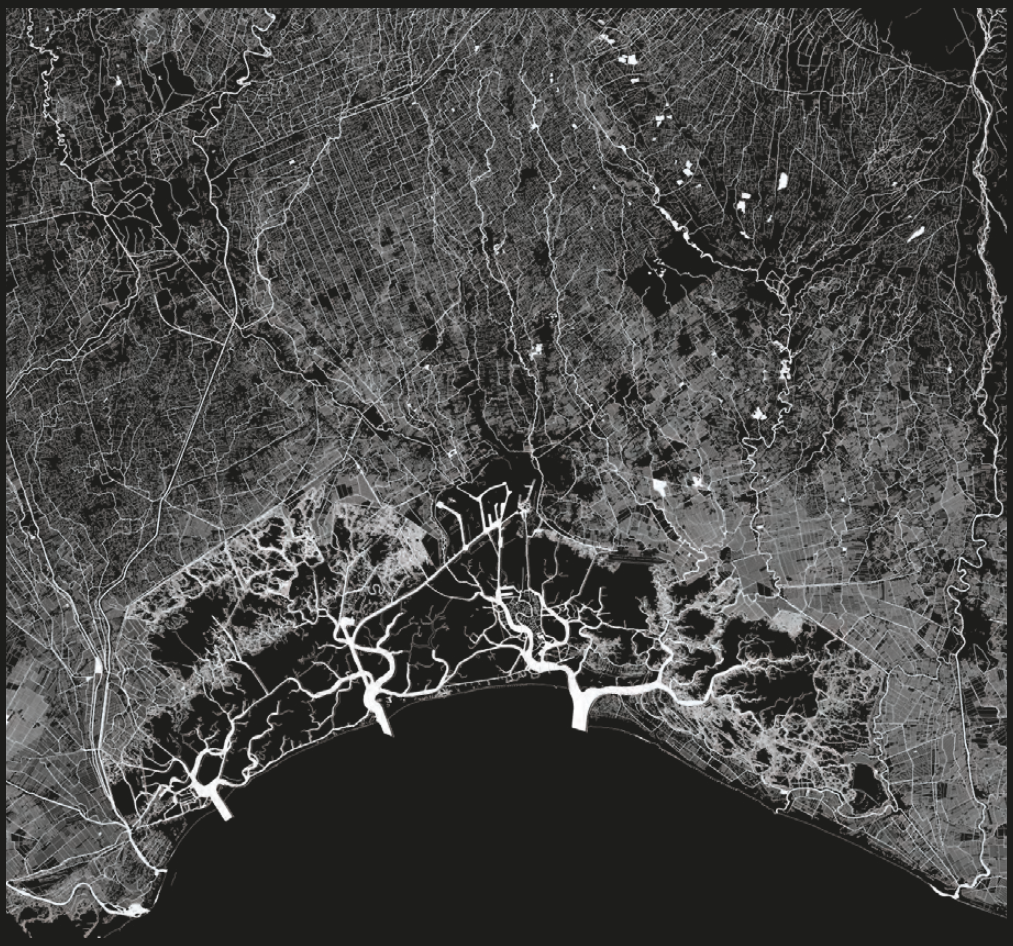


Bathymetry of the lagoon and orography of the drainage basin

0 2,5 5 10 km

Among the fundamental layers that can affect the development of a territory over time, the first derives from the orography, reliefs and geological nature of the ground. Once the water is removed, the lagoon territory speaks to us of a continuum whose true nature of amphibious and indefinite ground is today interrupted only by the microreliefs of man-made defences which, however, tend to disappear on a geographical scale. The limits become more precise in the centre and towards the sea, appearing more and more uncertain as one goes towards the lateral and innermost portions of the lagoon.

Water transition



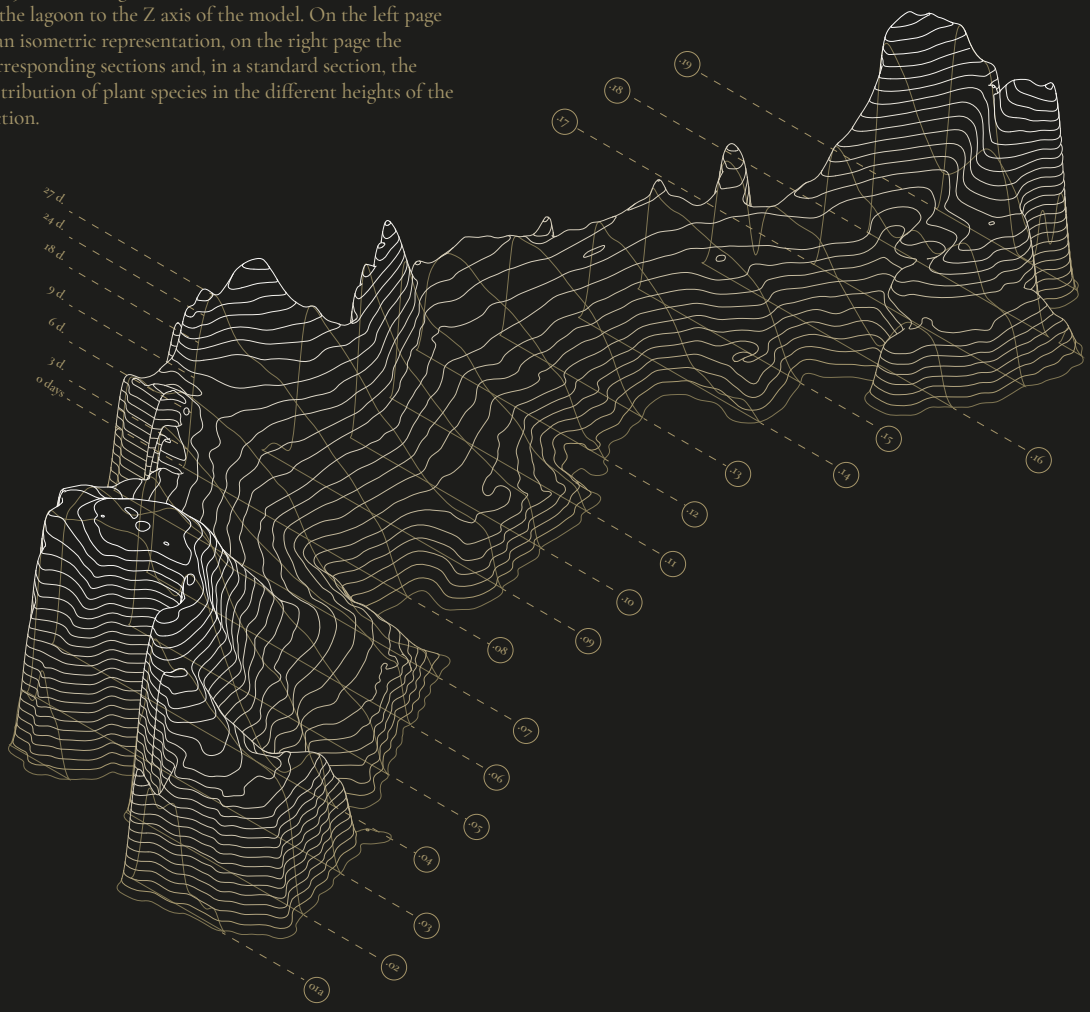
Main and minute hydrographic network of the lagoon and drainage basin

0 2,5 5 10 km

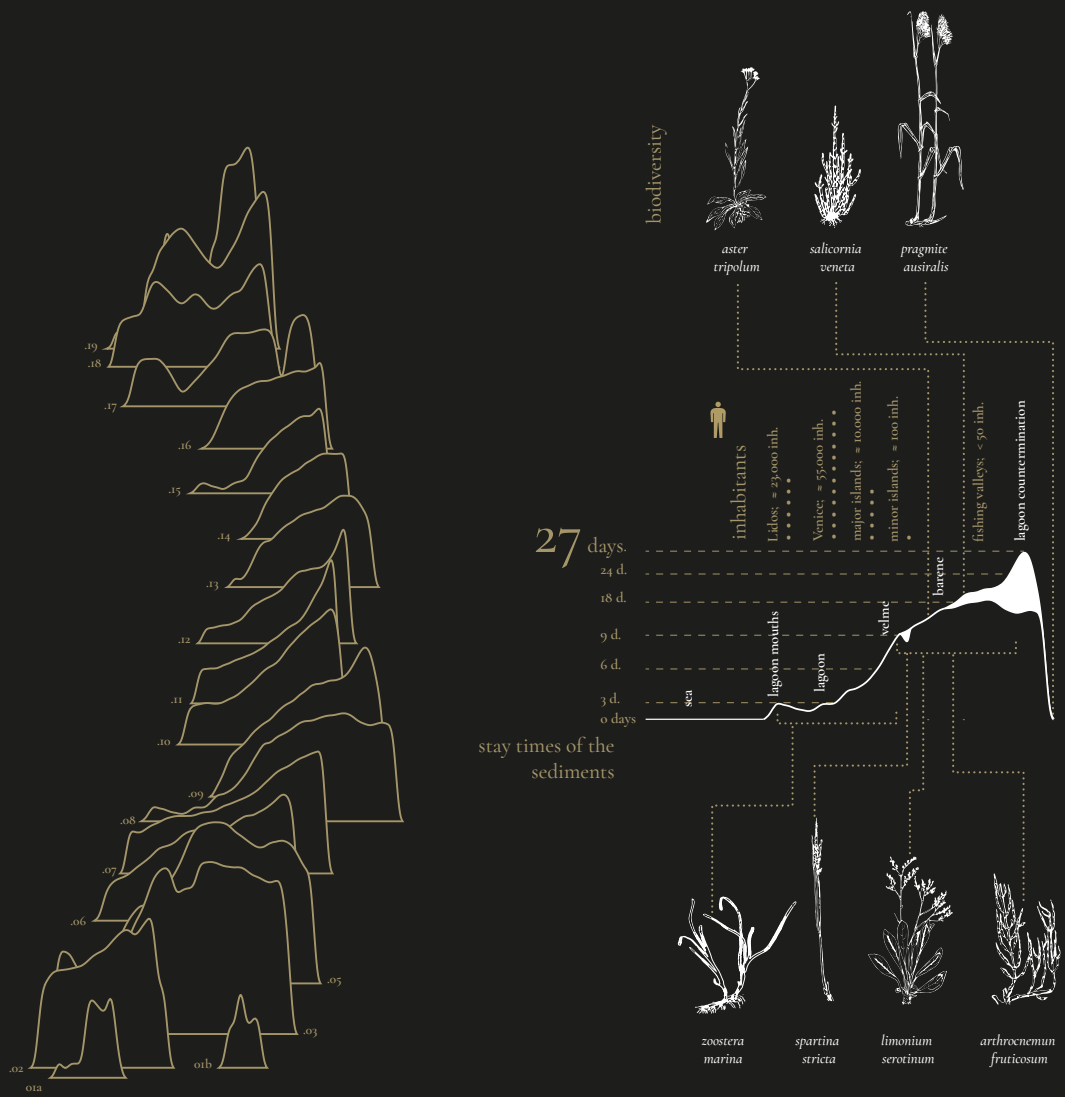
The lagoon regulation has been a project aimed for more than five centuries at governing the hydrodynamic equilibrium of the space between water and land. To define an interior and an exterior and fix the peremptory limits of the lagoon, canals have been built, rivers dammed and diverted, entire territories drained. However, the geographic layer of water still gives the image of a continuous network in which borders tend to dissolve. Especially towards the north-east, as the rivers move towards the valley, they take on increasingly sinuous courses until they transform seamlessly into meandering canals and then into the *ghebi* that structure the lagoon.

Transition gradient

The lagoon as a mountain
Three-dimensional representation of the lagoon built according to the original idea of Tagliapietra and Sigovini (2009), associating the residence times of the sediments in the lagoon to the Z axis of the model. On the left page is an isometric representation, on the right page the corresponding sections and, in a standard section, the distribution of plant species in the different heights of the section.



The transition gradient allows to combine and connect in a macro descriptor the complex relationships that exist between the variation of the hydrodynamic forces from the sea towards the hinterland and the variation of 'other ecological factors, such as water exchange, salinity variation, structure sediment, turbidity, nutrient load [...]. All these variables combine in a compound gradient that we will call the transition gradient' (Tagliapietra and Sigovini, 2009, p. 21). To describe the importance of these aspects and the operating mechanisms of the transition gradient, biologist Davide Tagliapietra proposes thinking of the lagoon as a mountain and, by analogy, as the salinity of the water and the currents that characterize the lagoon vary, associating them with the variation of heights and in the temperature that char-



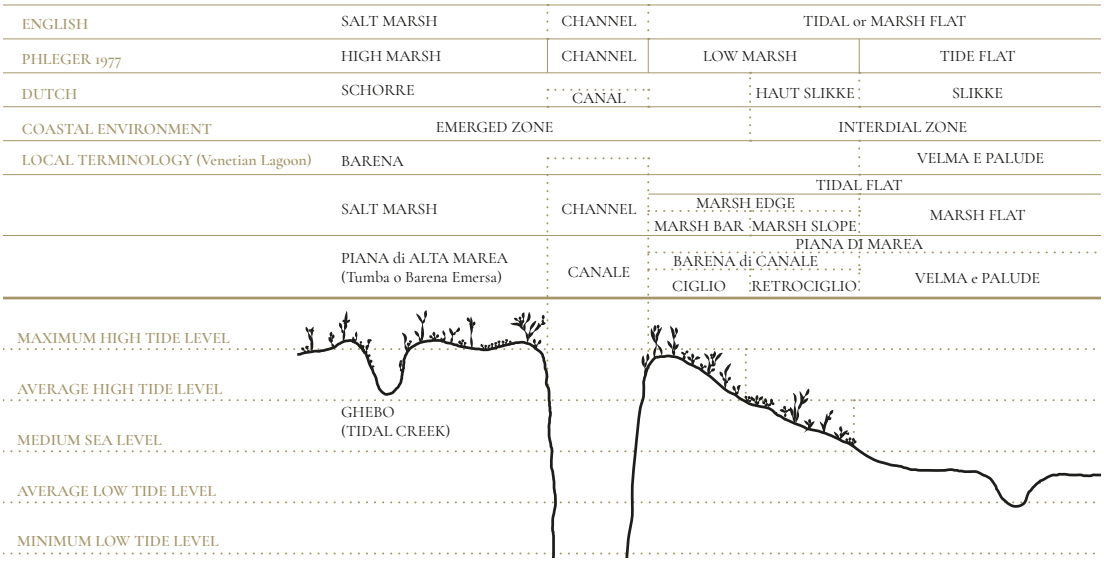
acterize the mountain. The analogy allows us to think of the lagoon in terms of valleys –the inlets, where the water exchange is greater and which also corresponds to higher biodiversity–, and peaks –the innermost and less oxygenated parts of the lagoon, where the environmental conditions are more extreme and only a few highly specialized species can survive. The metaphor of the mountain, however, could allow us other analogies, for example in relation to the conditions of use that characterize the lagoon, where the transition between the dead lagoon and the living lagoon also corresponds to transitions in the practices that cross it, with mass tourism and cities located mostly on the plains, and less inhabited and increasingly abandoned conditions towards the innermost areas and the less accessible valleys of the lagoon.

The lagoon as a mountain

Designing embankments, *barene*, fishing valleys

If the water space of Venice were an entire territory, the dead lagoons would probably be its 'internal areas'.[▸3] The northern and southern dead lagoons, so named for the shallow depth and difficult navigability of the waters, like the mountain peaks and other inland areas of the country, are inaccessible territories, at high risk of abandonment but characterized by a high availability of natural resources. These are fundamental spaces because, as mentioned, they have important ecological functions on which the health of the entire lagoon depends. If to outline the foundations of an ethics of the earth and the origins of an ecological thought Aldo Leopold invited us to 'think like a mountain' (Leopold 1949), today the metaphor of the 'lagoon like a mountain' is mobilized by some biologists to explain the strong interdependent relationships that exist between the various parts of the lagoon, the value of the heterogeneity of its environments and the fundamental functions that we can attribute to shallow waters (Tagliapietra and Sigovini 2009). If we think of the lagoon as a mountain, 'the valleys represent areas with fast water exchange while the peaks of the mountains are highly confined sites, in which water stagnates most' (p. 26). These internal parts of the lagoon, like the mountain peaks, 'will be inhabited by a few species well adapted to harsh environmental conditions' (p. 27). Most of these ecological functions are carried out by the dense vegetation that populates the salt marshes and on which the oxygenation of the shallow waters depends. 'This vegetation, made up of a few highly specialised halophilic species, is of vital importance for the origin and maintenance of the salt marshes thanks to the functions it ensures: it retains the sediments and debris carried by the tide and those produced by the vegetation itself, with nourishing effects that counteract the loss of altitude due to contraction or subsidence; it filters the waters, purifying them; it determines shading on the ground, especially important in prolonged summer emersions as a factor in maintaining humidity and therefore cohesion; it protects the surfaces from wind erosion and the edges from the natural erosion of currents and waves; and it has a braking effect from the tidal expansion when it is submerged' (Bonometto 2014, pp. 13-14). For the inhabitants of the metropolitan city that rises around the

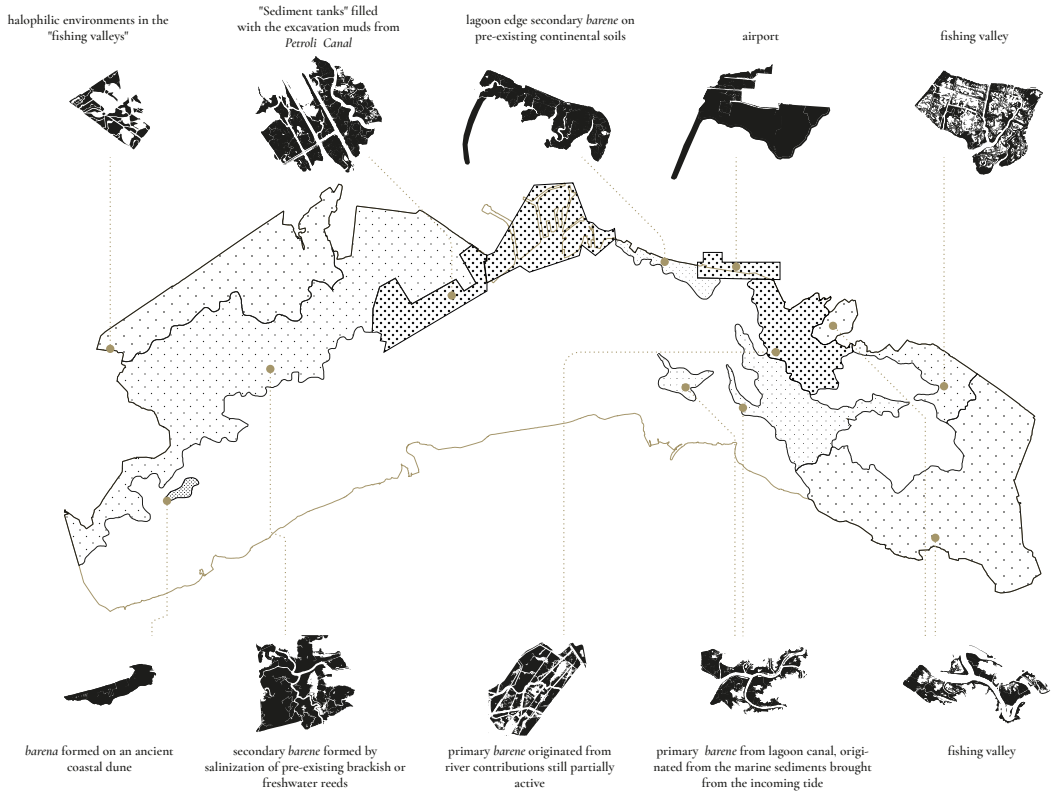
▸3 According to the Annual Report on the SNAI-*Strategia Nazionale per le Aree Interne* (National Strategy for Internal Areas), 'are internal those areas characterized by a significant distance from the main service supply centers (Health, School, Mobility), but also by a high availability of important environmental (water, agricultural systems, forests, natural and human landscapes) and cultural resources (archaeological heritage, historical settlements, abbeys, small museums, craft centres)'.



Typical section indicating the parts that compose a *barena* located at the margins of a channel
Redesign from Albani *et al.*, (1984).

lagoon, the salt marshes are the amphibious lands where they can experience a possible urban wilderness (Daniel 2008). Although due to the biological characteristics mentioned above these places can be compared to a 'third landscape', 'an unexploited place [which] appears by subtraction from the anthropized territory' (Clément 2014, p. 7); they are (and always will be more often) object of small projects of transformation, consolidation and maintenance. These are hardly ever major works but examples of minimal urban planning whose effects reverberate on the one hand on the hydraulic and biological regime of the entire lagoon, on the other on the complex of landscape relations on which the entire metropolitan city is structured. Like the mountain peaks, these parts of the lagoon are, and will increasingly be, the subject of widespread micro-interventions on which the healthiness of the 'downstream' area depends. In these parts of the lagoon the project is the result of an incremental transformation process that is positioned between landscape ecology, techniques that are derived from environmental engineering, materials, and the local know-how of inhabitants and fishermen (Grechi *et al.* 2018).[▸4] The consolidation interventions on the *barene* margins ensured by various techniques contribute to the preservation of the *barene*

▸4 In this regard, see the LIFE VIMINE project (2013-2017) which proposed to define and apply a new type of integrated approach to land management, based on the protection from erosion of the innermost *barene* and marshes of the Venice lagoon through the implementation of small naturalistic engineering interventions with low environmental impact involving local communities and stakeholders. The demonstration project tested the effectiveness of this type of approach in the northern lagoon, in the area of the islands of Burano, Mazzorbo, Torcello and the Palude dei Laghi. See in this regard Grechi *et al.* (2018).



***Barene* areas differentiated by origin and current state**
Redesign from Bonometto, 2015, p.19.

facing the canals that are most exposed to wave motion. The most effective include the insertion, at the edges, of *burghe* disposed on mattresses, cylinders filled with stones or other degradable material capable of absorbing the stresses deriving from wave motion without constituting an impermeable barrier to the free flow of tides and nutrients.

For the consolidation of the edges of the *barene* on the minor canals, micro-devices made of bundles of twigs or straw have been successfully tested, kept solid in the ground by small wooden poles whose purpose is to retain the sediments naturally carried by the currents on the shallows (Bonometto 2008). In some cases the *barene* are the subject of actual replanting projects for the morphological restoration of lagoon areas that have been degraded over time, in other cases they may be amphibious lands imagined where they never existed, such as the morphological structures conceived by D'Alpaos to counter the wave motion of large ships along the *Petroli Canal*, environmental systems capable of slowing

►5 In reality, as pointed out by D'Alpaos and also by Bonometto, the morphological protective structures along the Malamocco Marghera canal, at least along the side directly facing the canal, could hardly be defined as *barene* due to their probably higher altitudes than those of a natural *barena* and edges that should be protected with cliffs or other materials capable of withstanding the important stresses that in that stretch of channel are caused by wave motion. 'In this section containment works have been designed and built several times, in several cases presented as 'artificial *barene*'. It should be clarified that the containment structures cannot be *barene*, even if consolidated with heavy inter-

down the tidal expansion and reducing the degenerative effects on other parts of the lagoon (D'Alpaos 2010, pp. 275–318).[5]

However, not all the surfaces of the dead lagoon are uninhabited territories. In the interstices between canals and salt marshes, on the margins and in the innermost parts of the lagoon, the centuries-old fishing practices take place in the valleys dedicated to the planting and breeding of juveniles, through micro-architectures made of gratings, sewers, small embankments, buildings for fishing and boat storage. The fishing valleys are amphibious lands, artificial landscapes furrowed by labyrinths of canals with an average section of seventy centimetres that reach up to two metres deep. In them every inch of the soil is modelled to regulate the currents, saline balances, temperatures, and to satisfy the needs of the fish in the different phases of its production cycle: whipping, breeding and growth, descent and collection. Depending on their hydraulic nature, the fishing valleys can be: closed, because they are surrounded by embankments; semi-embanked, when the banks are interrupted and the flow of the tide is guaranteed by racks of marsh reeds; open, because they lack any protection. In addition to their nature, the different structures of the valleys can also be subdivided according to their functional nature: 'structures of connection and hydraulic interchange; water supply structures, capture structures and fish relaying; housing and technical and technological service structures; structures for hunting; defensive structures' (Zanetti 1995, p. 299).

Although the presence of fishing valleys has been opposed since the times of the Serenissima due to the major implications that these forms of urbanization have on the maintenance of the lagoon's hydraulic system,[6] it seems appropriate to note that since the Middle Ages they were a model of polyculture 'based on respect and support for the reproductive rhythms of the fish' (Bevilacqua 2009, p. 33). Moreover, today many of those processes of incremental transformation, not to mention the daily maintenance that make the innermost amphibious lands of the lagoon healthy and habitable, are actually related to the fishermen who live in the valleys and small islands.[7]

The issue of the modelling of amphibious areas, in particular of the conservation and restructuring project of the lagoon morphology, is a recent and not very historicized issue, largely attributable to the first Special Law for Venice of 1973 (n. 171) and to the

ventions, but protections of a very different nature such as cliffs or the like' (Bonometto 2008, p. 84) (auth. trans.).

[6] On the relationship between the embankment of the valleys and the malaria phenomena in the lagoon, see Rosa Salva and Sartori (1979).

[7] In the aforementioned LIFE VIMINE project for the maintenance of the salt marshes, local workers were also chosen, such as the fishermen of the island of Burano. 'Choosing local workers has several advantages: they are able to effectively navigate the shallow waters and the intricate canals of the northern lagoon of Venice, which they know well; they are better able to interpret the variability of local weather and sea conditions; they manage to quickly reach the *barene*, which they live near, reducing the time and costs of travelling by boat; they can constantly monitor the *barene* during their daily fishing activities and promptly communicate the need for routine maintenance' (Grechi *et al.* 2018, p. 25).

subsequent variants and regulations of implementation in which 'the safeguarding of Venice and its lagoon is declared a problem of pre-eminent national interest' (L.171, 1973, Art.1). In this sense, the 1966 flood represents a point of no return for the history of the Venice lagoon. If on the one hand the completion of a more modern Venice comes to a halt –and the lack of expansion of the third industrial zone condenses the paradigmatic nature of the event– on the other hand a slow rethinking of the territorial project is launched to face the environmental challenges, whose first signs begin to show in the 1970s. From that moment, the eustatism of the Adriatic Sea (a matter of global significance), subsidence, the pollution phenomena caused by hydrocarbons, the structural risks associated with the passage of oil tankers, become themes that increasingly concern Venetians; some of these are grouped in the *Fronte per la Difesa di Venezia e della Laguna* (*Front for the Defense*

MENTRE IGNARI

festeggiavamo il Natale sul fronte delle barene giorno e notte le chiatte al soldo del Consorzio per l'ampliamento delle Zone Industriali continuavano a riempire di sabbia i cassoni di colmata per uccidere definitivamente le barene.

Per metterci tutti di fronte al fatto compiuto, per mettere anche il Comitatone di fronte al fatto compiuto.

VENEZIANI

Le barene sono il polmone della Laguna: senza barene la Laguna muore, con la distruzione della Laguna muore la nostra Città.

DIFENDIAMOCI

Pretendiamo la sospensione di ogni lavoro finchè non siano compiuti gli studi sul modello della Laguna.

Fronte per la Difesa di Venezia

Manifesto of the Front for the Defence of Venice and the Lagoon, 1970 (?)

'WHILE UNAWARE
we celebrated Christmas, on the *barene* front the barges in the pay of the Consortium for the expansion of the industrial zones continued day and night to fill the sediment caissons with sand to definitively kill the *barene*. To put us all in front of the *fait accompli*, to put the *Comitatone* also in front of the *fait accompli*.
VENETIANS
the *barene* are the lungs of the lagoon: without the *barene* the lagoon dies, with the destruction of the lagoon our city dies.
LET'S DEFEND OURSELVES
We demand the suspension of all work until the studies on the model of the Lagoon are completed.

Front for the Defence of Venice'

Logo of the Front for the Defence of Venice and the Lagoon
1970 (?), author unknown

of Venice and the Lagoon), whose protagonists would have a crucial role in the definition of the first Special Law in 1973 and in the demand for political instances, even at a national level, which refer to ecological thinking (Mencini *et al.* 2020).
The Front had a project for the lagoon that subverted and called into play all the rules of modern Venice. An article entitled '*Acquicoltura in laguna*' (*Aquaculture in the lagoon*), published in the pages of *Casabella* magazine in 1971, illustrates a project for the lagoon in which the endemic productive characteristics of the territory (such as fishing) are radicalized and extended to build an alternative development model to that experimented in the petrochemical plant of Marghera (Pisenti 1971). In the idea of the Front 'the lagoon is the physical concretization of a series of relationships that gave life to the city and that must be revitalized'. For this reason, the project envisaged the restoration of the jurisdiction of the territory included within the *conterminazione lagunare* under a single municipality (Venice); the expropriation and opening of closed fishing valleys, transforming the banks into grids for the free expansion of the tide; the reduction of the depths of industrial canals, the deviation of the *Petroli Canal* to the site of the original Fisolo-Molini and Lussariol canals; the reduction of inlets from the current 400-900 metres in width to about 100 metres; the removal of industrial waste from the lagoon (Pisenti 1971, p. 19). The project reinterpreted in a contemporary key and placed at the centre of the economic and social life of the Venetian metropolitan area activities such as fishing and fish farming that had been practiced in these areas for a very long time (Lanaro 2015, p. 43). It is no coincidence that already in the Byzantine age there is evidence of the transfer –if not usurpation– of vast water surfaces and *barene*, used respectively for fishing and hunting, from state

authorities to communities of inhabitants and religious institutes (Crouzet-Pavan 2015, pp. 99-100). Parallel to the physical transformations, Pisenti's project therefore investigated a new development model based on the fish market, shellfish and fish farming reorganized into forms of cooperatives with participation in the profits of workers. A system that, putting in place the other centres of the lagoon 'from Chioggia to Lio Piccolo', could have 'attempted an economic discourse of the same magnitude as that of the industrial development of Marghera' (Pisenti 1971, p. 20). An alternative development model based on industrial aquaculture, university sector research and local resources, should have brought Venice back to the centre of a series of global relations, where 'man is increasingly impoverishing the emerged lands and running out of the possibilities that these offer; the reserve of resources is constituted by the sea and it is therefore to it that humanity must turn in order to survive' (Pisenti 1971, p. 20).
In the development scenario outlined by the Front, the territories of sandbanks and fishing valleys are no longer conceptualized

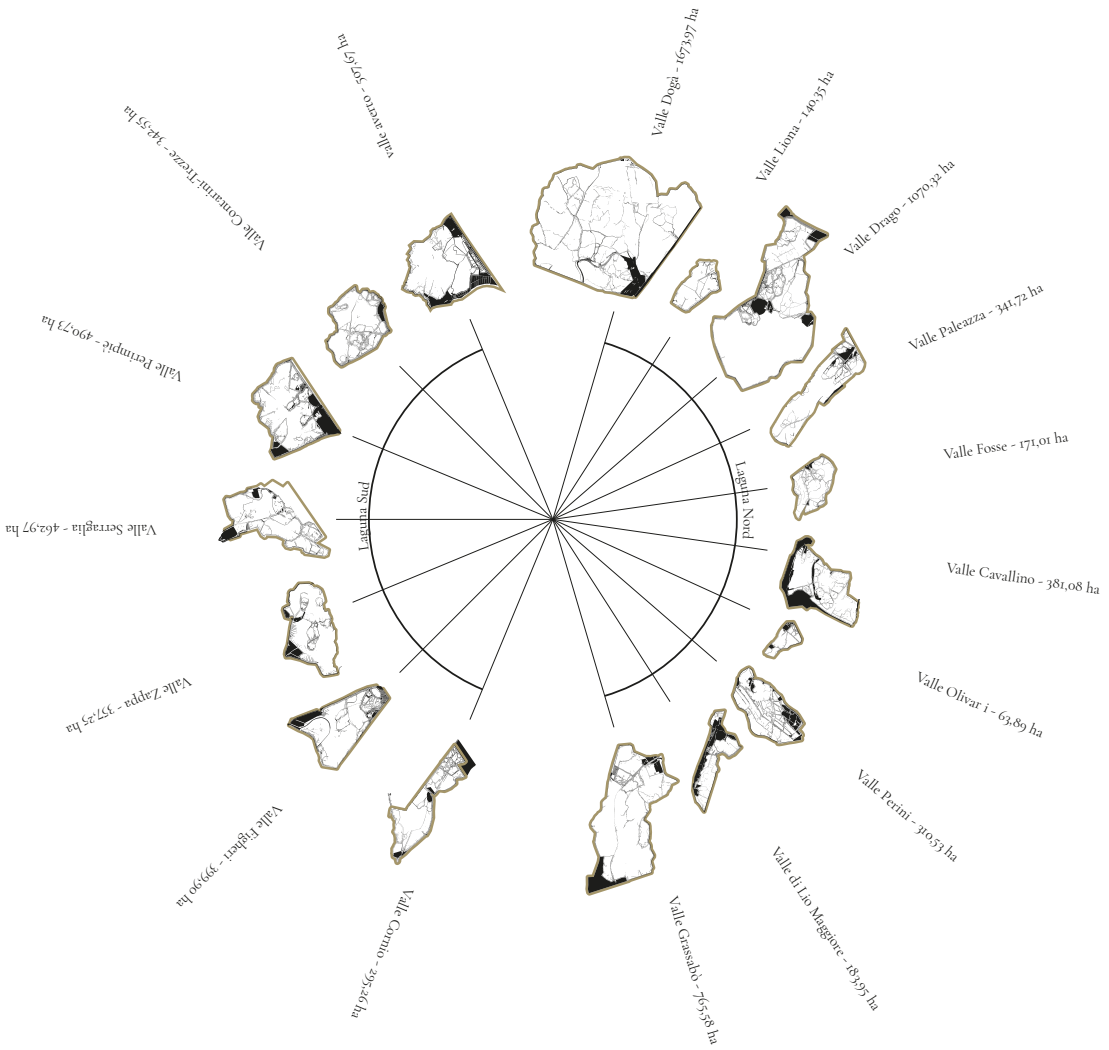
Vittore Carpaccio (Italian, about 1460 - 1526)
Hunting on the Lagoon (recto); *Letter Rack* (verso), about 1490–1495. Oil on panel 75.6 × 63.8 cm (29 3/4 × 25 1/8 in.) 79.PB.72 The J. Paul Getty Museum, Los Angeles

SURFACE COVERED BY FISHING VALLEYS

11'000 Ha

NUMBER OF FISHING VALLEYS

17



The system of fishing valleys of the Venetian Lagoon, denominations, and surfaces

as reserves, internal areas, biological service spaces. The internal spaces of the lagoon become inhabited and productive places, the heart of an economy based on industrial aquaculture which, looking to the future, to the challenges posed by the energy transition and average sea rise could one day extend beyond the limits of the lagoon itself. Faced with the current crisis of lagoon agriculture on an industrial scale that has developed in recent decades between the Cavallino peninsula and the surroundings of Chioggia (Zanetti 1995, p. 135), the rethinking of the aquaculture system can be complementary to a return to forms of more refined and niche agriculture, linked to vegetable gardens, orchards and vineyards that dot the most peripheral areas of the lagoon.

Designing beyond the lagoon. A heritage of embankments and ditches

Beyond the limit of the lagoon it is now possible to observe the liminal territory of the upper Adriatic and, more precisely, the space that was once occupied by the prehistoric lagoon that stretched from Ravenna to Grado, as if it were a large hydraulic machine made up of cultivated fields, wetlands, lagoons, dunes, beaches, polluted production areas, and tourist areas, whose survival is threatened today, like Venice, by rising water and by the risks deriving from climate change. Today this territory contains 25% of the national coastal areas at risk due to the concomitant threat of subsidence and eustatism. Natural phenomena, the latter, to which the origin of the lagoon itself is due, but which today are exacerbated by processes that are largely attributable to human action (Cavalieri 2016).

Today the great plain surrounding the lagoon is a territory-palimpsest designed by the microreliefs of the water. Sometimes they are excavations, such as canals, ditches and drains. Sometimes they are corrugations of the earth, such as embankments, dams, and bridles. Sometimes they are small deformations of the soil surface, as is the system of bedding of the fields. Sometimes they are decisive reliefs, such as the sediments of the great road and railway arteries that connect the Venetian capital to Padua, Treviso and the Po Valley infrastructure system. Sometimes they are walls, like the sheet piles of the lagoon marginal systems towards the polluted waters of the industrial areas of Porto Marghera. A territory of embankments and ditches that specialize the soil of the Venetian

metropolis, define its grain, its geometries; they dissect and design spaces that collect and separate parts of the territory: the cultivated countryside of the reclamation at the edge of the lagoon; the production areas and places of residence of the agglomerations that from Mestre to Dolo and to Mira branch off towards Padua along the Brenta Riviera, to the north, along the Terraglio; the large territorial parks and natural areas along the Sile, the Brenta, the Bacchiglione, the Marzenego; and the wetland systems on the lagoon. Secular corrugations of the ground that have made habitable an uninhabitable territory that was once a swamp, and whose future is still –as always– threatened by the very same water that attempts have been made to eliminate for centuries.

According to Davide Tagliapietra, in the future the lagoon will increasingly find itself at the centre of very large areas that will have to be rethought through a territorial scale project that provides for the de-polderization and conversion of use of vast agricultural areas maintained today through mechanical drainage, creating in these territories ecological gradients between marine systems, new freshwater marshes, hydrophilic forests, spaces for lamination and recharge of the inland aquifers (Fabian *et al.* 2021); Transformations so relevant that they legitimize the rethinking of the ecological role of entire parts of the dead lagoon. In a recent interview Tagliapietra affirms that 'the lagoon could also lose certain characteristics, for example the circulation of the water [from which it could derive], the disappearance of the salt marshes, a simplification of the morphologies, a reduction of species, unmanageable changes in salinity, however, these ecological functions or ecosystem services [could] be moved elsewhere. If we act in time, the *barene* can be reformed elsewhere in thirty to fifty years. In this case, by de-poldering and managing the whole area where possible, we could have both areas in which we try to reorient nature through the re-appropriation of water and land, and on the other hand there could be places where some ecosystem services can be optimized. [...] Salty fields [for the cultivation of glasswort and other halophytic species], nursery areas for some fish species [...], an area of oligohaline gutter [...] with reeds or hydrophilic woods' (Fabian *et al.* 2021, p. 165).

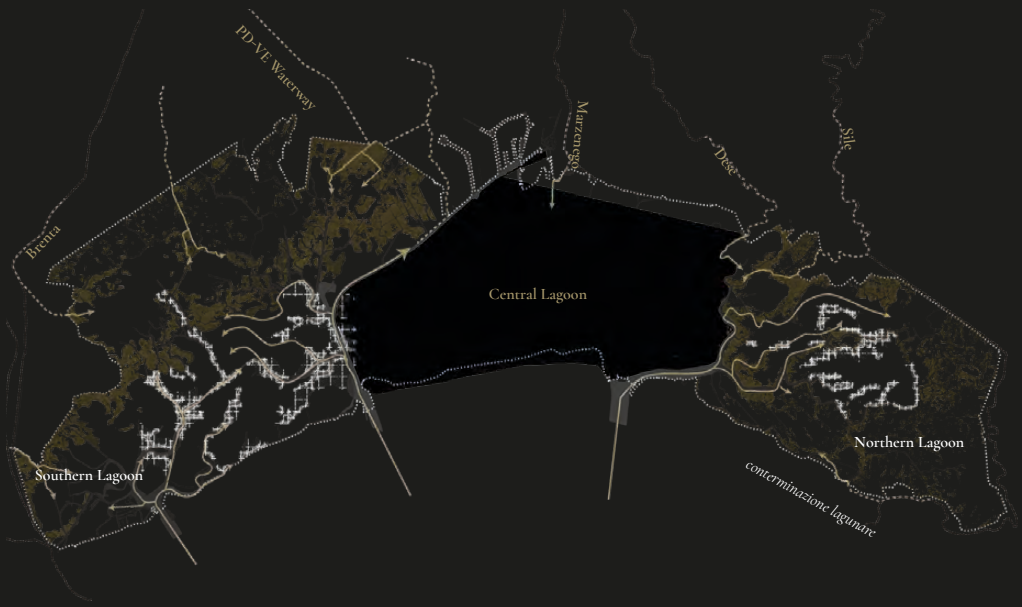
What-If

Scenario: regenerating the space of the *barene* of the northern and southern lagoons

In the project for the care and maintenance of the innermost space of the lagoon, sandbanks and fishing valleys play a fundamental role. If well preserved and strengthened, the *barene* can help to mitigate the waves and tides, favour the deposition of sediments, and through the halophilic vegetation can contribute to the oxygenation of inland waters. The activities related to the fishing valleys, and more generally to the support structures for fishermen, constitute a fundamental defence of the internal territories, making the less accessible parts of the lagoon a low intensity inhabited and productive place.

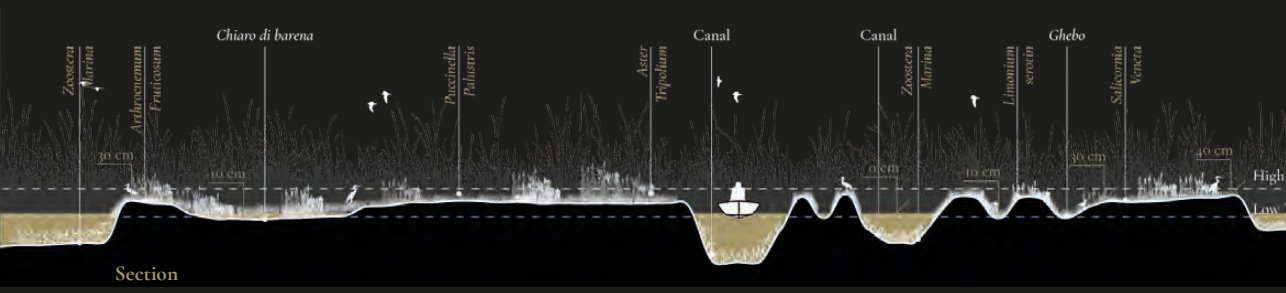
The scenario investigates the strengthening and conservation of sandbanks and fishing valleys, intended as large reserves of biodiversity, production sites with important ecological functions, CO_2 absorption devices to counter the effects of climate change, inhabited wetland parks in the heart of the lagoon.

Designing *barene*



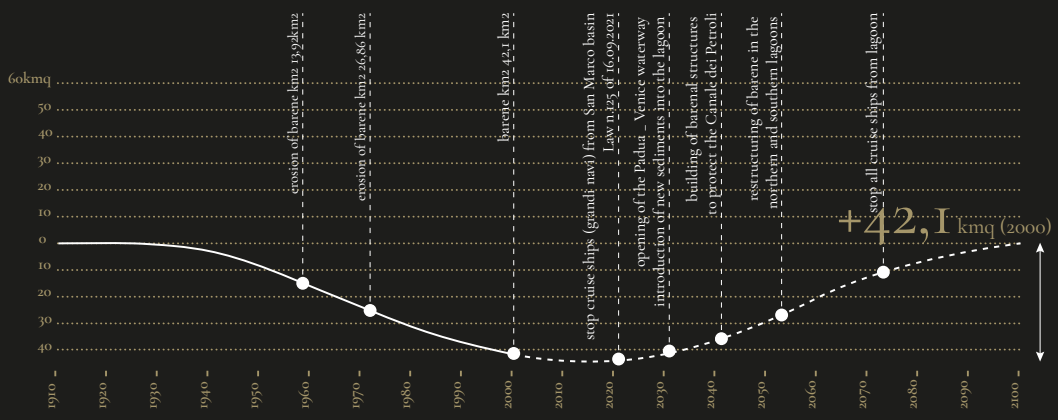
Scenario of restructuring and strengthening of the *barene* in the northern and southern lagoons in 2100

0 2,5 5 10 km



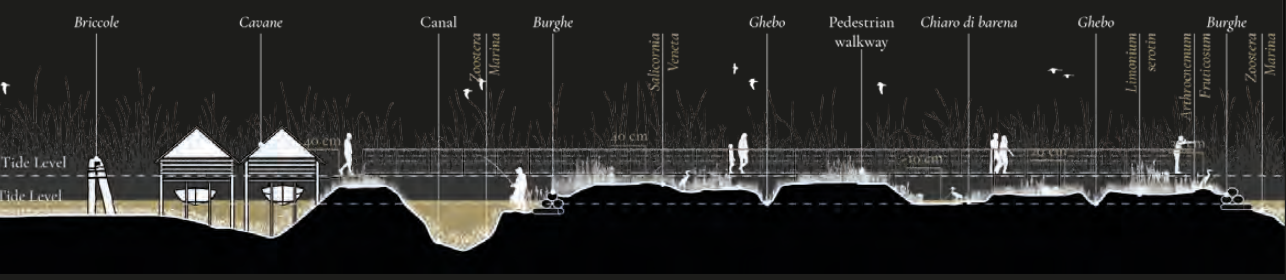
Section

Barene are corrugation points of the lagoon bathymetry that emerge above the surface of the water. Below the surface they become *velme*, changing their behaviour and name. There is no conceptual difference between *barene* and *velme*: a *velma* turns into a *barena* and vice versa, depending on the deposit or the erosion of sediments brought by currents, the share of the water and the oscillation of the tides. Between +25 centimetres (internal tabular *barene*) and +45 centimetres (strong *barene*) in height compared to mid-sea levels, the *barene* are amphibious devices, periodically submerged by high tides, eroded by small alveolar channels called *ghebi* and by small water surfaces in correspondence to internal depressions called *chiari di barena* (*barena* clearings). They are populated by dense, highly specialized halophilic vegetation, the most common species of which are *Limonio* and *Salicornia*, which are respon-



Scenario: objectives and strategic actions
Evolution from 1910 to 2100

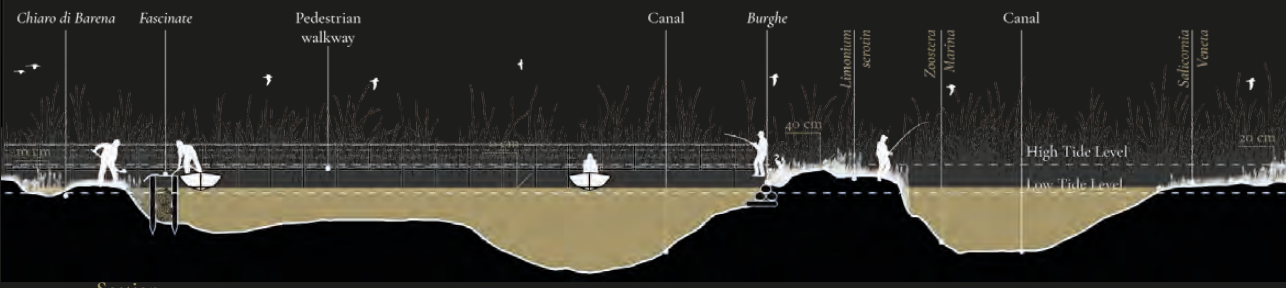
Circulation patterns of lagoon currents: before 1965, nowadays and in the hypothesis investigated by the proposed scenario



sible for fundamental ecological functions for the health of the entire lagoon, including the shading of the soil, the maintenance of organic sediments, the purification of water, protection of surfaces from erosion, absorption of CO_2, and oxygenation of the water in the innermost areas of the lagoon.

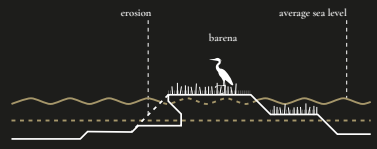
The scenario of the restructuring of the *barene* in the northern and southern lagoons investigates the possibility of a continuous maintenance project, partly aimed at countering the erosive action of wave motion, partly to consolidate *barene* that have been lost over time, partly still for the introduction of morphological structures to counter the fragility of the lagoon. The scenario envisages the insertion of new sediments in the lagoon: in the southern lagoon through the Padua-Venice waterway, which in this way also assumes the role of flood channel for the Brenta river; in the northern

Processes of contermination, backflow and formation of natural or artificial salt marshes

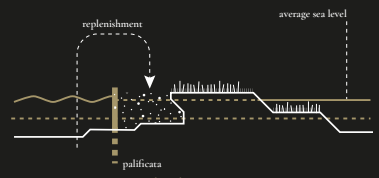


Section

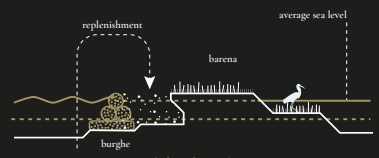
lagoon through the construction of locks on the rivers that originally flowed into the lagoon. These actions, together with the new lagoon currents deriving from the closure of the central lagoon, make it possible to restructure surfaces of *barene* to extensions prior to 1965. The process of formation of the new *barene* takes place through the construction of boundary structures aimed at trapping the sediments coming from the adjacent *velme*. The sediments are deposited in the containment structures partly by the lagoon currents, partly through mechanical refluent processes. The boundaries can be used for the construction of artificial *barene* or for the protection of of the existing ones from currents and waves. They can be made using systems with strong mechanical resistance such as piles made of trunks driven into the ground or ditches filled with stones or by means of biodegradable fascinate systems.



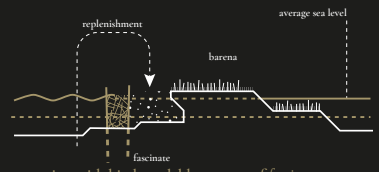
margin erosion of the *barena*



resistant protection with piling

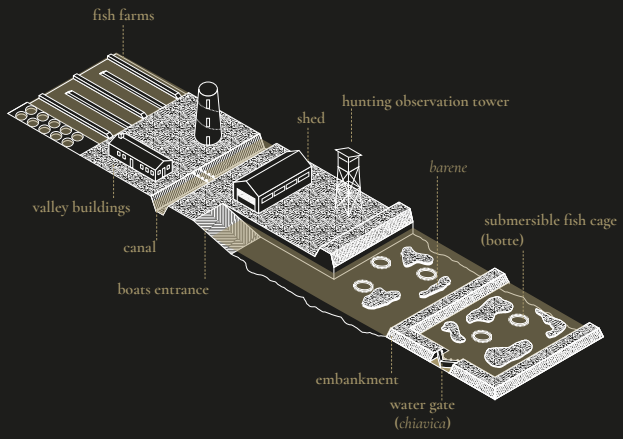


resistant protection with *burghe* and mattresses

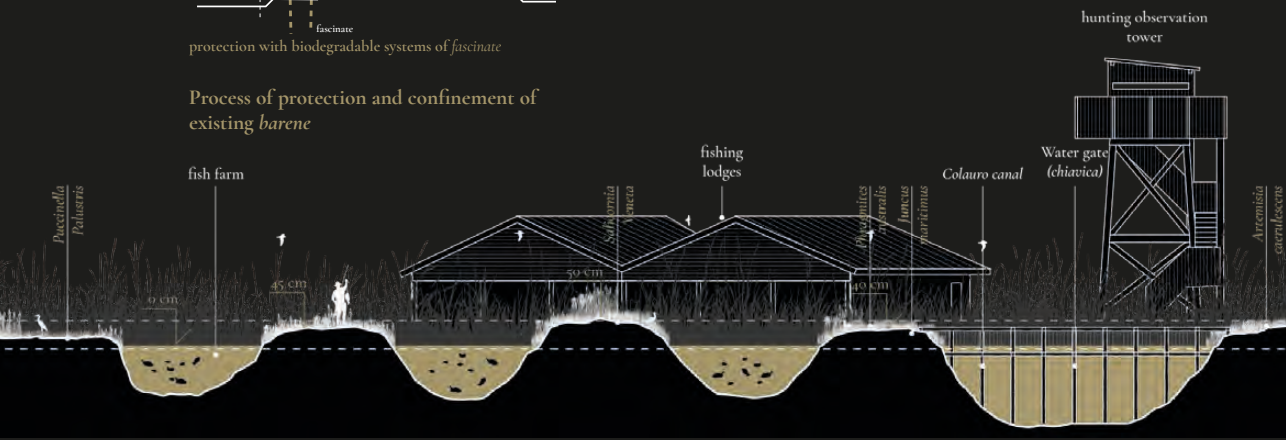


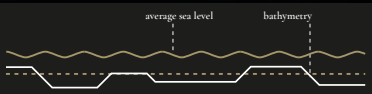
protection with biodegradable systems of *fascinate*

Process of protection and confinement of existing *barene*

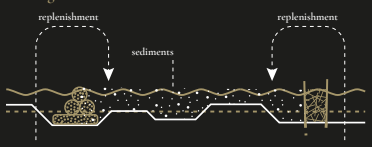


Functional scheme of a fishing valley

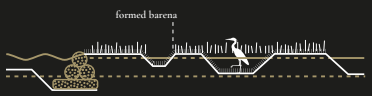




existing situation



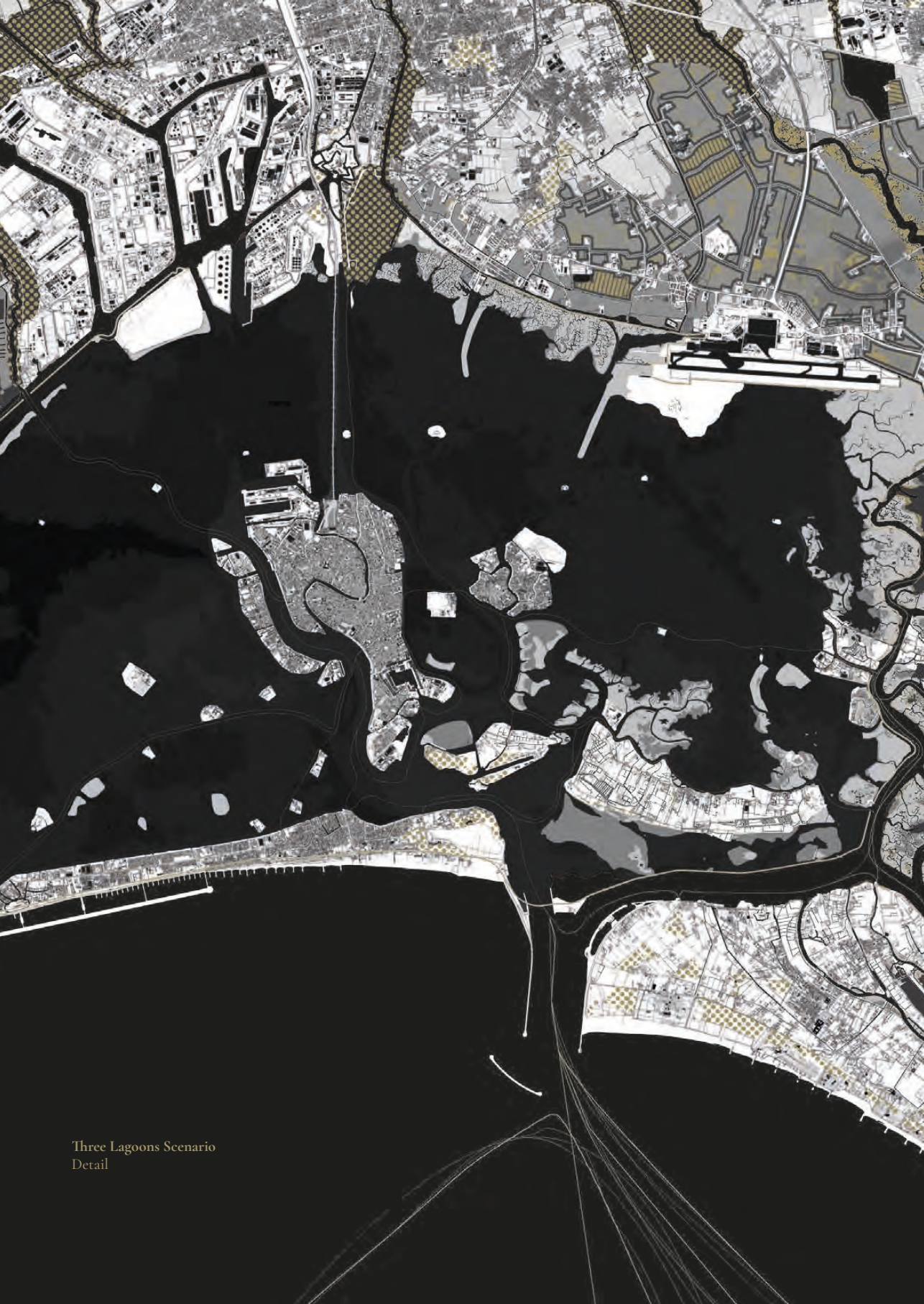
contermination and replenishment with sediments of the adjacent *velma*



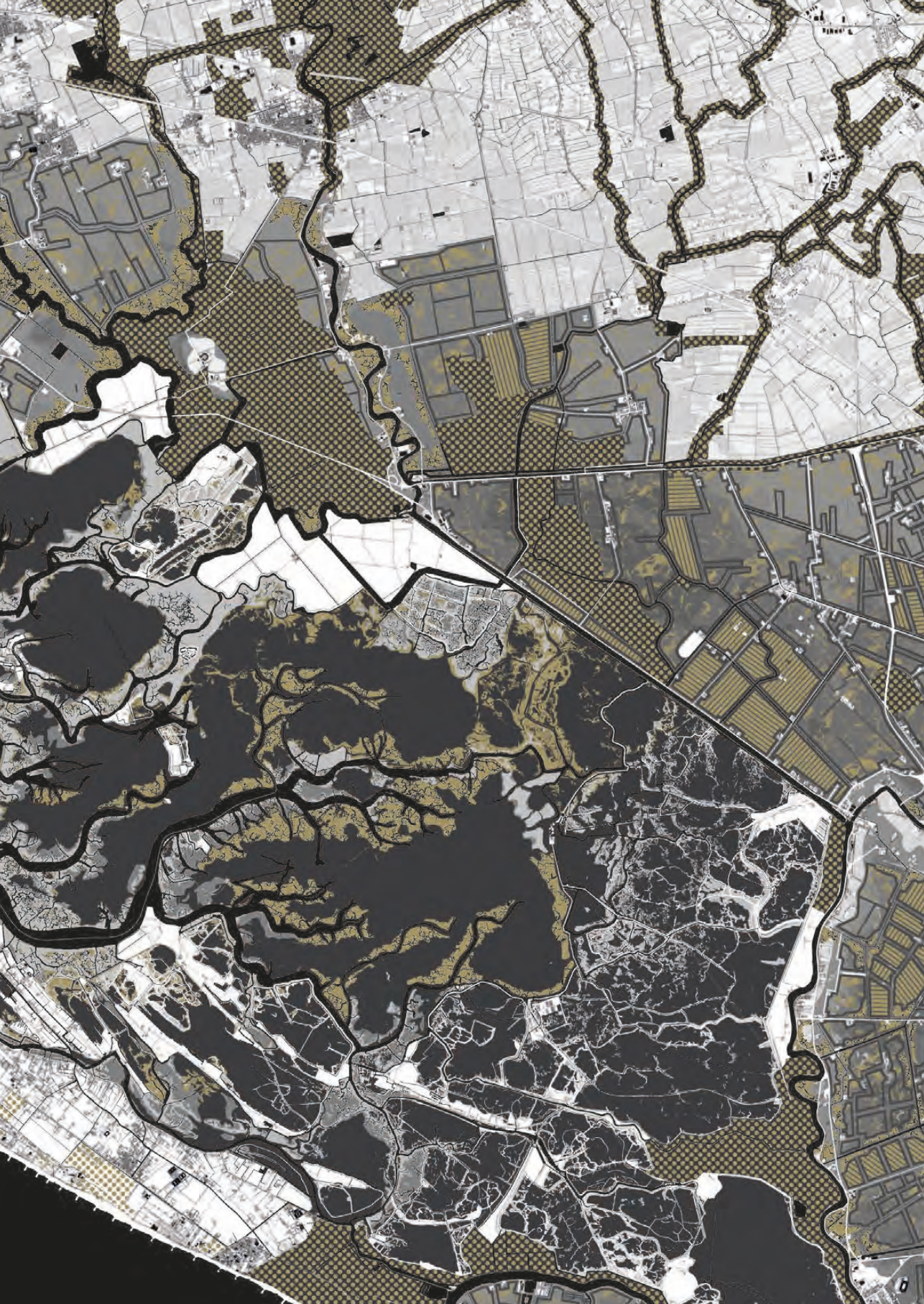
formed *barena*

Process of forming new *barene*

The fishermen of the smaller islands and of the fishing valleys are entrusted with the task of garrison and continuous maintenance of the surfaces of *barene*. The side lagoons become large parks on which low-intensity forms of tourism are organized.



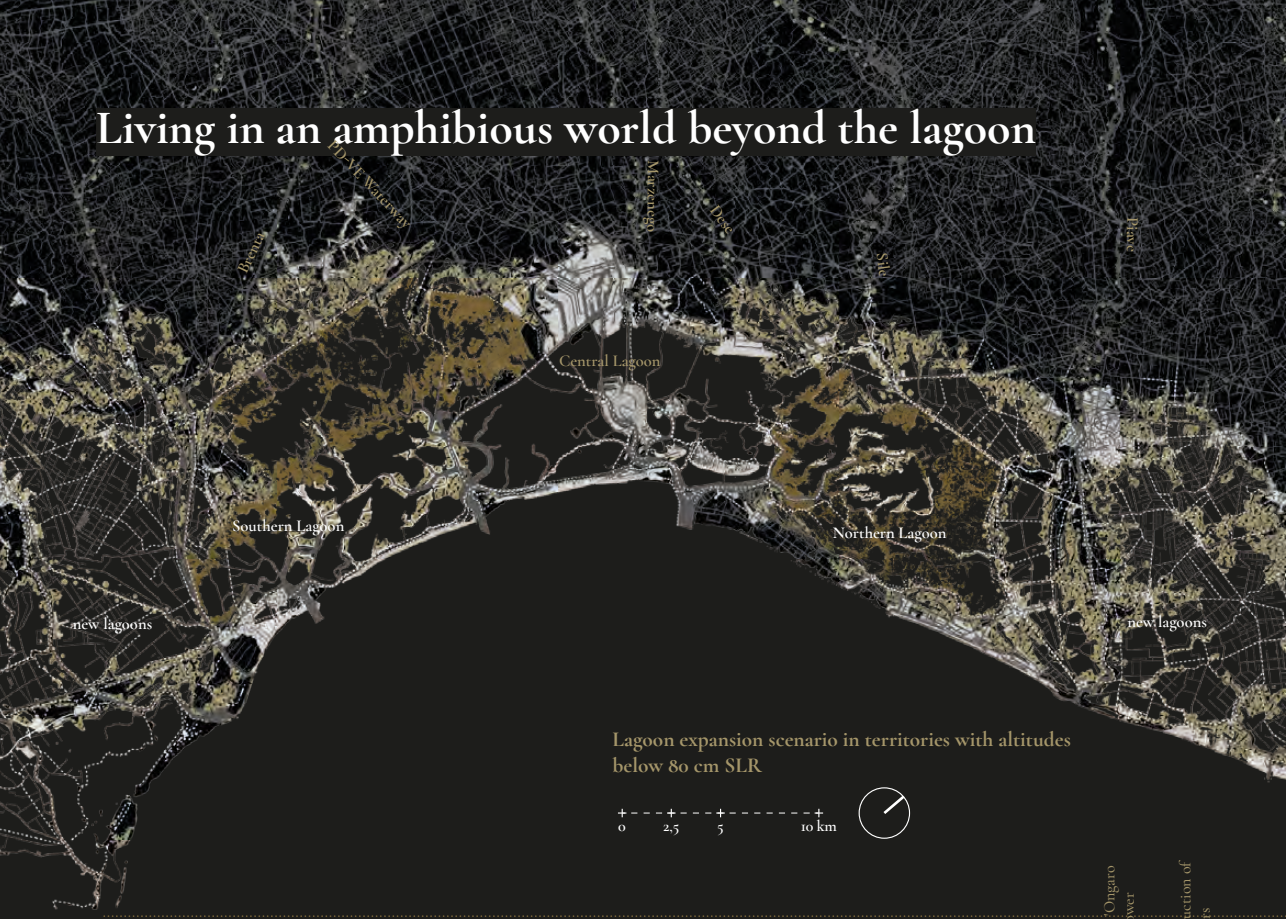
Three Lagoons Scenario
Detail

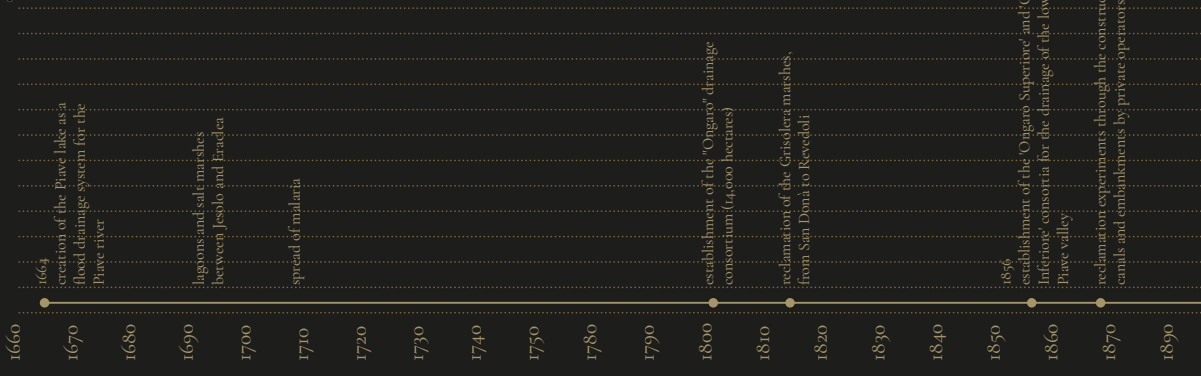


Scenario: living in an amphibious world

In view of the sea level rise of about 50-80 centimetres by 2100, entire parts of the lagoon could be closed to defend Venice. However, these actions will not be sufficient to protect the depressed territories of the upper Adriatic, nowadays inhabited and kept dry by a complex hydraulic system made up of embankments, canals, pumps and dewatering pumps, the result of a long process of hydraulic reclamation stratified over the centuries. Given the prospect of the energy crisis and climate change, this complex hydraulic system will become unsustainable and ineffective. The scenario explores the possibilities of habitability of territories returned to water as a result of the expansion of the lagoon beyond the current *conterminazione lagunare*.

Living in an amphibious world beyond the lagoon





The territories to the east and west of the lagoon have ground altitudes between -100cm and +80cm above sea level, defining an extensive agricultural area inhabited by small urban centres and scattered buildings. The chronological reading of the anthropization processes shows how these areas were still largely uninhabited salt marshes until the 17th century. Starting from the 19th century, first through the work of private individuals and then with the intervention of the state, these regions have become the laboratories of an imposing reclamation project that has made it possible to develop techniques and forms of governance that after 1920 were then exported to many other Italian regions. The scenario explores the conversion possibilities of these territories due to the rising seas and the energy cost determined by the mechanical drainage of the entire region (see timeline of historical events from 1660 and the projection to 2100). In the scenario, the