ASSEMBLAGES IN THE VENETIAN LAGOON

Humans, water and multiple historical flows

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ABSTRACT: Since the dawn of its existence, and at times thanks to ambitious interventions, Venice and its lagoon have needed to be constantly protected from the various ways in which water has reclaimed its existence. This article asserts that the ways in which Venice approached the watery world imply a tendency to relate to the natural environment as if it was something humans ought to separate themselves from, rather than something towards which they could harmoniously relate. As a result of this mindset, the natural changes which made humans interventions necessary are most often phrased as events abruptly sprouted into being, and less as obvious consequences of pre-existing ecological alterations of the islands' ecosystem throughout the centuries. In order to read these events differently, this article adopts assemblage theory as delineated in the work of Manuel DeLanda (2006], 2016), according to which history comprises a multiplicity of flows, each belonging to a specific social reality. As such, this article auspicates a way to read ecological alterations of the Venetian lagoon beyond the mere actions of humans and to see, instead, socio-natural changes as the result of intricate relations between heterogenous agents and forces.

KEYWORDS: History, Venetian lagoon, MOSE, assemblage theory, Manuel DeLanda

Introduction

The origin of the Venetian Lagoon dates back about six thousand years, when the opposition of both terrestrial elements (i.e. the rivers which brought debris from inland) and maritime ones (i.e. water currents caused by the Adriatic winds) facilitated the formation of the lagoon ecosystem (Scortegagna, 2009). The lagoon comprises of a surface area of about 550 km² with an average depth of 1 metre. It includes islands, tidal marshes, mud flats and a complex network of tidal channels (Zonta et al, 2018). The lagoon is connected to the Adriatic Sea by three inlets (Lido, Malamocco and Chioggia), which enable the exchange of water and sediments during tidal cycles (Gambolati and Teatini, 2014; Madricardo et al, 2019) (Figure 1).

With a long history of extensive human intervention which heavily affected its evolution, the Venetian Lagoon is anything but a pristine coastal environment (Zonta et al, 2018). In fact, since the dawn of its existence, the city of Venice has been in a constant effort to resist the water and silt which were always ready to reclaim the natural environment which the city was built upon. As Ciriacono writes, "[t]he history of the Venetian environment... becomes the story of the measures taken to adapt to such changes" (2018: 158 - see also Cosgrove 1993: 41-45). Among these measures, the diversion of its major tributaries outside the lagoon to prevent sedimentation of debris has been surely one of the most ambitious. In fact, starting

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in the 16th and proceeding into the 17th Century, three of the main rivers entering the lagoon (Brenta, Bacchiglione and Piave-Sile) were diverted to discharge directly into the sea in order to avoid the silting-up of the lagoon by sediment from the mainland (Cosgrove, 1993; Zonta, et al 2018). Other ecosystem alterations that took place throughout the centuries in the lagoon have been the construction of rigid defences to protect its islands and strands from storm waves (the Murazzi, built between 1740 and 1782); the construction of sets of jetties at the inlets (1808-1927); the land reclamation for urban and industrial development (the creation of Porto Marghera between 1927 and 1970, as well as the dredging of a deep canal for oil tankers [Canale dei petroli] in the 1960s) and, in more recent years, the construction of mobile barriers (the MOSE System) to protect Venice from exponentially rising tidal levels (cf. Zonta et al, 2018; Madricardo et al, 2019). And thus, the cultural and historical heritage of the city of Venice and its lagoon needed to be constantly protected from the various forms in which the natural environment reclaimed its existence. In fact, would it be the debris from the rivers that threaten to erase its lagoon, or the salty water from the sea which erodes its foundations, or would it be the extraordinary increase in tidal levels due to climatic changes that submerged half of its surface? Venice has seldomly been in a peaceful and sustainable relation to its natural surroundings.



Figure 1 - Venetian Lagoon and its three inlets (Gambolati and Teatini, 2014).

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This article investigates the relation between Venice and its watery world, paying particular attention to two alterations of its ecosystem: the diversion of the three main rivers in the 16th-17th centuries and the construction of the MOSE System in the 21st Century. These interventions are usually considered as examples of engineering efforts brought about to protect Venice from changes of the natural environment which surrounds it. This article argues that the natural changes which made these interventions necessary are most often conceived as events abruptly sprouted into being, and less as consequences of anthropological modifications of the lagoon ecosystem throughout the centuries (Asmundo, 2017). In other words, this article looks at these two interventions not as singular responses to disconnected natural phenomena, but as recurring reactions that occurred due to preexisting human ecological alterations. In order to read these historical events differently, the article adopts the concept of assemblage as delineated by the work of Manuel DeLanda (2006, 2016). Assemblage theory is inscribed within a new materialist theoretical account to the study of social reality (Dolphijn and van der Tuin, 2012). Although comprising different genealogies, new materialist theories wish to overcome binary constructions and ontoepistemological dualisms like the ones between Nature and Culture, Mind and Body, Science and Society (Barad 2007; Latour 2005); to discard notions of transcendental rational subject (DeLanda, 2006, 2016), as well as the linear deterministic view of time and space (Grotz, 2005; Massey, 2005). This article wishes to use of assemblage theory to provide a different approach of narrating the relation between Venice and water implied in its hydrological interventions by resisting the tendency to consider these interventions as humans' responses to sporadic natural changes, and to proposes instead to see them as the unfolding of specific historical processes arising from heterogenous elements, among which humans play an important although not constitutive role (DeLanda, 2006, 2016). In other words, instead of reading humans' interventions in Venice as belonging to a singular linear temporal flow wherein events successively unfold in reaction to those that came before them, assemblage theory considers history instead "as a multiplicity of flows, each with its own variable rates of change, its own accelerations and decelerations" (DeLanda, 2016: 14). In this way, social changes can be seen to result from natural changes which are themselves the result of socionatural changes carried out elsewhere at some other spatial-temporal point. And thus, reading historical narratives through assemblage theory allows to move beyond the mere actions of humans and see both social and natural changes as the result of an intricate relation not determined merely by humans' intentions but by heterogenous agents and forces (ibid).

This article is divided into three sections. The first section presents assemblage theory as delineated by Manuel DeLanda, it shows the similarities of this theory with the aquapelagic thinking proposed by Hayward (201a, 2012b), as well as how the concept of aquapelagic assemblage can be used to provide a different account of Venice's history. The second section analyses through assemblage thinking two historical events which involved the relation between the city of Venice and water: the diversion of the rivers in the 16th-17th centuries and the construction of the MOSE System in the 21st Century. The third section uses the insights gained through the assemblage analysis to argue that both the way of phrasing human interventions as well as the interventions themselves are the result of an assiduous tendency to relate to the natural environment as if it was something humans ought to separate themselves from, rather than something towards which they can more harmonically relate (Latour, 1993; Haraway, 2016; Neimanis, 2017). In fact, the relation between Venice and water can be said to reflect a mindset wherein humans tend to face natural changes through the construction of walls, barriers, or otherwise majestic engineering interventions, rather than adopting other types of interventions which would bring the two elements towards a more sustainable and long-lasting relationship (Beatly, 2014; Madricardo et al, 2019). The

article concludes by considering which other possible engineering solutions could help Venice cultivate a long-term relation with water. Examples of these different types of interventions are engineering uplifting of the main island (Gambolati and Teatini, 2014), seascape engineering (Perkol-Finkel et al, 2018) and, overall, a different ethical approach to water (Beatly, 2014).

1. Assemblage theory and aquapelagic assemblages

Numerous genealogies coexist under the umbrella term of new materialism. Among the most well-known theoretical developments are object-oriented ontology (Morton, 2007), actornetwork (Law, 2004; Latour, 2005), speculative realism (DeLanda, 2006, 2016), posthumanism (Braidotti, 2013), and agential realism (Barad, 2007). Although it would be impossible to draw absolute lines between these theoretical approaches, we can delineate some of the major conceptual features that distinguish new materialisms from other (21st Century) materialisms. There is for example a common endeavour to pay a renewed attention to reality (Bryant et al, 2011) and to overcome the branch of post-Kantian continental philosophy which assigns to matter the realm of the passive and to human phenomena (i.e. language, cultural identity) the realm of the active (van der Tuin and Nocek 2019). As such, these theories pay instead considerable attention to understanding how both humans and non-humans, as well as their practices, are harmonically and indissolubly intertwined (Haraway, 2016), with no privileged site of agency (Barad, 2007). In their analyses, everything becomes alive (Bennett, 2010), everything – that is – is capable of making a difference (Latour, 2005), of influencing the unfolding of the events and the construction of the social although without following any ultimate purpose or rational intentionality (Deleuze and Guattari, 1987; DeLanda, 2006, 2016). Following new materialist principals, there are no entities that can be said to exist in themselves, and therefore, no practices able to be actualised individually (Barad, 2007; Kohn, 2013). Conversely, everything and every practice is the result of intra-activity of heterogenous elements, each with equal agency and potential (Latour, 2005).

This work adopts the new materialist approach of assemblage theory as delineated by the work of DeLanda (2006, 2016). Adopting assemblage theory means to consider every entity and event as an assemblage comprising heterogenous elements, each with their own relative autonomy and potential. As a result, at every level of analysis we are dealing with assemblages of assemblages rather than autonomous essences. In other words, within an assemblage, different entities are thought to relate to each other constantly without losing their own specificities in this relation and thus without blending with the overall assemblage. According to DeLanda (2016), each assemblage has two emergent capacities: the capacity to enable and the capacity to constrain its elements. He calls these capacities bottom-up and top-down, respectively. On the one hand, an assemblage is thought to enable its parts to relate together in order to create emergent properties which the assemblage did not have before. On the other hand, it affects its different parts in order to maintain itself as it is. For example, a social community is an emergent property of an assemblage comprised of different people and spaces that relate day-to-day to each other in certain ways; but a community is also an assemblage which maintains itself through time thanks to its ability to affect its parts through, for instance, rituals, or common linguistic practices. Therefore, as DeLanda writes, "wholes emerge in a bottom-up way, depending causally on their components, but they have a top-down influence on them" (2016: 21). Specifically, following Deleuze and Guattari (1987), DeLanda states that assemblages transform in time depending on the degree of intensity they have in enforcing its components. An assemblage with a low

degree of intensity of enforcement will be a whole which is deterritorialising (i.e. becoming heterogenous, expanding), whereas an assemblage with a high degree of enforcement is one which is territorialising (i.e. becoming homogenous, restricting). In this way, territorialisation is the process that gives an assemblage its defining boundaries and maintains those boundaries through time, while deterritorialisation is the process that decreases density among components, promotes dispersion or eliminates some boundaries.

In a similar vein, the concept of aquapelago proposed by Hayward (2012a, 2012b) and successively developed among others by Suwa (2012), Maxwell (2012) and Fleury (2013), aims at reconsidering islandic environments as assemblages of multiple terrestrial and aquatic actants. In fact, introduced as reformulation of the word 'archipelago', aquapelago as a word and concept wishes to embrace a more holistic notion of islands as socio-geographical spaces strictly constituted by the ways both marine and terrestrial elements interrelate. As Hayward writes: "the word 'archipelago' is now too heavily associated with concepts of islands as land masses to be useful as a designation for regions in which aquatic spaces play a vital constitutive role" (2012a: 5). Thus, an aquapelagic framework can be useful to understand islands not as self-standing, stable entities, ontologically separated from the water that surrounds them, but, instead, as diverse and lively realities brought into being by the constant performative interaction between multiple heterogenous elements, realities "where the distinction between land and sea becomes nonsensical" and "evaporates in ... everyday life" (Suwa, 2012: 14). In this article, making use of both assemblage theory and the concept of aquapelago, Venice is thought of as an aquapelagic assemblage comprising heterogenous entities (e.g. humans, terrestrial and marine non-human elements, artefacts), which are in a relation that connects them to each other but that does not constitute them (DeLanda, 2016). In this way, each and every entity maintain their relative autonomy although they cannot be said to exist outside of the relations they have with other elements within the assemblage. In particular, Venice, as an aquapelagic assemblage, is conceived as emerging from the interaction of heterogenous components and as evolving in time through processes of territorialisation and deterritorialisation. As such, this article aims at reading certain events that happened in Venice beyond the mere actions of humans and more as holistic processes in the development of the assemblages. By way of doing this, the article wishes to show how human interventions could be considered not as the sole engine behind the unfolding of history, but as actions among the action of other components which together make the history of Venice as we know it.

A different approach to history

"[H]ow misleading it is to view human history as comprising a single temporal flow" writes DeLanda (2016: 37). For him, history involves instead a multiplicity of flows, each belonging to a specific social reality. In fact, as for example we cannot ever coherently speak of a unified Western Society for the mere fact that social wholes are always made of singular social realities, for DeLanda we also cannot speak of a capital-H History, in that each social reality has its own specific history. In other words, different realities coexist relatively autonomously within what is considered as the West and it would be misleading to group each of these realities within one singular historical flow. On the contrary, each of these realities shall be considered as following their own relatively autonomous historical process (see also Massey, 2005). As such, for DeLanda entities/wholes like 'the West', 'the Market', 'Globalisation' or 'Modernity' are "*reified generalities* comprised of a vast array of heterogenous components each with a date of birth and (potentially) a date of death" (2016: 13-14). Instead of abstract essences existing elusively in people's conceptualisations, wholes are concrete sets of components existing always in a specific time and space. DeLanda calls these sets 'assemblages', and according to assemblage theory our analysis should always focus more on the elements that comprise an assemblage rather than on the generalised wholes derived by the sum of these elements (2006, 2016). To analyse specific historical events through assemblage theory means therefore not to see these events as if they were autonomous entities resulting from a past that now ceased to exist. In this case, in fact, we would end up considering history as a singular temporal sequence wherein events successively unfold in reaction to those who came before them. On the contrary, an historical event is to be seen as one which emerges always as part of a vast array of specific histories happening at different temporal and spatial scales. For example, an event like the conquest of Venice by the French troupes in 1797 is not merely a temporal stage placed within a worldwide historical temporal sequence, but an event derived by the collision of multiple histories comprising the assemblage of Venice: the history of warfare and defensive fortifications, of the transport system, and/or the history of tax systems (DeLanda, 2016). According to assemblage theory, then, each of these historical specificities decreed Venice's impossibility to defend itself in the face of the new weaponry of the French army, with its enormous tax bases and manpower resources (Cosgrove, 1993).

Like the assemblages delineated by DeLanda, aquapelagos are performed entities (Hayward 2012a), entities that come into existence thanks to constant interactions and processes of relation between its components. As assemblages, aquapelagos are not self-contained and self-sufficient, "[t]hey are not bounded, ahistorical 'utopias'... rather, specific products of ongoing processes in actual locations" (Suwa, 2012: 15). Human actions are not the only actions that determine the constitution of aquapelagos: all their ontologically heterogenous elements (submarine depths, waters and currents, aerial and weather systems, cultural landscape, belief systems, memories, floras and faunas) have agency and are thought to contribute in the historical unfolding of the assemblage (see also Dawson, 2012). Although human actions are surely essential in the aquapelago's becoming, humans themselves cannot be said to exist outside their relation with other actants (Hayward 2012b), and their actions are therefore the result of interactions and reactions with these actants in particular spatiotemporal locations. "Each and every aquapelago is differently constituted and temporally fluid" (Hayward, 2012b: 5). Thanks to the adoption of the concept of the aquapelagic assemblage, there is no one single history through which to read all the events happening in Venice, but multiple historical specificities depending on the assemblages we take into consideration in our analysis. In this article Venice is considered as an aquapelagic assemblage wherein other assemblages exist, each with their own properties and histories.

Venice and water through assemblage theory

This section takes into account the assemblage of Venice and the processes of territorialisation and deterritorialisation that the city experienced in the past centuries. In particular, it looks at processes which involved the relation between the city and the watery world which surrounds it. As such, two events will be analysed: the diversion of the three main rivers (Brenta, Bacchiglione and Piave-Sile) in the 16th-17th centuries and the construction of the MOSE system in the 21st Century. Each of these events will be considered as processes of territorialisation happening in response to processes of deterritorialisation in the assemblage. In fact, we will show how each intervention can be seen as examples of the high degree of coercion the city of Venice enforced in its components in order to maintain its own homogeneity in relation to water. Importantly, by way of considering events as processes that arose in response to other processes, rather than singularities resulting out of

singular historical sprouts, the analysis will show how the relation between humans and water in Venice has been mainly phrased as one comprising two ontologically separate elements that must remain as such. On the contrary, following new materialism, this article argues that said relation can be rethought as one between two elements with the same agential status, and thus impossible to separate once and for all (DeLanda, 2016; Haraway, 2016; Neimanis, 2017). As a result, at the end of this article we will argue that architectural and engineering interventions in the watery ecosystem of Venice should aim more at enduring and sustainable co-relation between water and humans, rather than strong separation between the two (Madricardo et, al 2019). In what follows, we read two engineering interventions as processes of territorialisation of the assemblage of Venice.

The Diversion of the Rivers

Venice is predominantly built on millions of tree trunks that were floated down to the lagoon on *zattere* (rafts) on the rivers Adige, Brenta and Piave-Sile in the 15th Century and were successively broken down and propped into the sea floor to construct the city's foundations (Cosgrove, 1993; Lane, 2008; Scarpa, 2019). In their encounter with the mud of the lagoon these trunks solidified in a way that has persisted to the present, albeit with the appropriate amount of maintenance (Figure 2).



Figure 2 - Maintenance of Venetian foundations (date unknown) (https://venicewiki.org/wiki/The_foundations_of_Venetian_palazzos)

However, the choice of building a whole city over tree trunks stuck in a muddy floor, besides the high level of maintenance, initiated other consequences for the city of Venice. In fact, once the trees were eradicated from the Cansiglio forests in the mainland, the soil of that region started to gradually crumble into the rivers (Lane, 2008; Asmundo, 2017). This resulted in huge amounts of debris arriving in the Venetian lagoon and threatening its ecosystem by turning it into a marshland (Cosgrove, 1993). In the long run, in fact, "such a process would have inevitably caused the lagoon to disappear, joining Venice to the mainland" (Gambolati and Teatini, 2014: 29). The Magistrati delle Acque, ancient Venetian officials charged with the conservation of the lagoon, called for the peoples of Venice to daily gouge the lagoon basin and empty it from the debris (Asmundo, 2017). However, as the problem soon became unmanageable, more ambitious interventions were planned: the rivers responsible for bringing this amount of debris to the lagoon (Bacchiglione, Brenta, Piave-Sile) were all diverted out of the lagoon and into the sea (Ciriacono, 2018). As Asmundo notes, it was at this point that "water management and designs in the mainland were increasingly connected with urban planning in Venice as well as landscape conservation in the lagoon" (2017: 28). Although at the completion of the rivers' diversion in the 17th Century the lagoon was debris-free, other effects soon appeared to its ecosystem. In fact, the natural composition of the lagoon's waters, with a balanced amount between the salt immitted by the sea once the tidal scour entered the lagoon and the fresh water brought in by the rivers, started to alter. As Gatto and Carbognin (1981) found in their study, once the rivers were diverted from the lagoon the level of salinity of the water changed and became drastically saltier. Furthermore, in another study made by Sarretta et al (2010) it was found that such salinity initiated the weakening of the soil and the erosion processes of which the Venetian lagoon is nowadays still suffering, with a consequent reduction of sandbars of more than 50% in less than 100 years (Toso, 2016). In other words, it can be said the contemporary erosion of the city was most probably initiated by the diversion of the rivers in the 16th and 17th centuries. In the next paragraph we present how the changing of salinity in the lagoon resulted in further need of engineering adjustments and ecosystems alterations. But before proceeding, however, in what follows we read the historical episodes just delineated (the deforestation of the Cansiglio forests for the appropriation of tree trunks, the high maintenance this project comported, the arrival of debris from the rivers, the consequential diversion of the rivers) through assemblage theory.

Reading these episodes through assemblage theory means considering Venice as an aquapelago evolving thanks to the performative relation of a set of heterogenous elements. In this case, the entry of a new set of components (i.e. the tree trunks) in the aquapelagic assemblage as a process of deterritorialisation necessitated, in return, a high degree of intensity of enforcement, in that, for example, these muddy trunks needed and still need constant maintenance and resource allocation. Thus, a movement of deterritorialisation initiated the beginning of another movement, this time of territorialisation, wherein different elements (i.e. the organising structure that made possible such maintenance, with the workers, the reward system, the wood, sand and water, each with their properties and capacities etc.) act to maintain the aquapelago as it is. Nevertheless, the initial movement of deterritorialisation brought also other unexpected consequences in the assemblage, namely the amount of debris arriving now from the *terraferma* to the lagoon and threatening the survival of the city. There was the need, therefore, for the initiation of another process of territorialisation: the daily emptying of the lagoon basin, with its consequential need of people and resources dedicated to it, and the more ambitious engineering intervention of the diversion of the rivers.

The movements of the assemblage can be summarised as:

- The eradication of trees from the Cansiglio forest and the construction and maintenance of Venice's foundations (territorialising)
- The arrival of large amounts of debris from the *terraferma* (deterritorialising)
- The emptying of the lagoon and diversion of the rivers (territorialising)

The Acqua alta and the MOSE system

The previous paragraph discussed the engineering project that was initiated to divert the main rivers out of the lagoon in response to the exponential amount of debris arriving there after the ground inland had weakened due to deforestation. The diversion of the rivers, in turn, had other consequences in the ecosystem of the lagoon. In fact, as Gambolati and Teatini write "as no fluvial detritus now entered the lagoon, the compaction of natural underground sediment lowered the level of the sea bottom" (2014: 29). In other words, with the disruption of the equilibrium between the amount of water and debris in the lagoon's sediments, the floor was deprived of replenishing soil and was gradually being eroded by tidal scour. Furthermore, the drop in fresh water in the lagoon resulted in a rise of the level of salinity of the water of the lagoon (Gatto and Carbognin, 1981), initiating the phenomenon of erosion (Sarretta et al, 2010; Asmundo 2017; Zonta et al 2018). These two phenomena – the deepening of the lagoon and the erosion of its grounds – are also happening today and are part of causes of the well-known Venetian phenomenon of the acqua alta, the flooding of part of the city due to marine eustasy and subsidence of the lagoon's floor (Thetis, 2010; Gambolati and Teatini 2014). While the acqua alta has been known in Venice for centuries (it was mentioned as far back as 589 AD), the frequency of flooding increased greatly during the second half of the 20th Century due to the increased pumping of groundwater for industrial and civil use (Gambolati and Teatini, 2014). In fact, in the 1960s, as the first industrial plants arose at Porto Marghera, water pumping increased exponentially to facilitate the peak of post-war industrial development. According to Gambolati and Teatini (2014), roughly speaking the overall lowering of land levels in the city of Venice amounts to 23 cm over from the early 1900s to the 2000s. Today the phenomenon of acqua alta is further accentuated due to sea level rise resulting from climate change and excessive groundwater exploitation on the mainland, representing major threats to the city of Venice (Thetis 2010). Thus, on the one hand, climate change is expected to provoke a sea level rise between 30 cm and 1 m in the coming years (IPCC, 2014). For a city that is situated as low as 80 cm above sea level (in the case of San Marco Square), such an increase in water level would be devastating (Umgiesser, 2020). On the other hand, the long-term effects of morphological intervention and anthropological use of the environment have resulted in a progressive increase in water depth, erosion of mudflats, shrinking of salt marshes, and the disappearance of tidal creeks (Zonta et al, 2018). In this precarious situation, as Umgiessser writes, it is of "utmost importance to see how the city can be safeguarded against this global threat" (2020: 1).

During the five years following the exceptional 1966 high tide (*acqua granda*), Venice approved a defence solution consisting of a system of mobile gates, or barriers, enabling temporary closure of the three inlet channels once the tide gets dangerously high: the MOSE System (Figures 3 and 4).

Studies like the ones conducted by Rinaldo et al (2008) and D'Alpaos (2019) researched how the structure built to host the MOSE mobile barriers, under construction since 2003, introduced additional and extensive anthropogenic modifications to the lagoon (see also Madricardo et al, 2019). One example of these modification is the narrowing of the inlet sections designed to provide space for auxiliary infrastructures, which altogether increased the flow velocity (Gambolati and Teatini 2014; Madricardo et al, 2019). Another example is the consequent change of habitat heterogeneity which enhances species biodiversity, resulting in the appearance of non-indigenous species (Wasson et al, 2005; Occhipinti-Ambrogi, et al, 2011). With the highest budget ever dispensed by the Italian state (6 billion euros), the actual working of the MOSE is still to be thoroughly determined and many of its functioning aspects remain to be studied more thoroughly (Umgiesser, 2020).



Figures 3 and 4 - The MOSE *paratoie* (barriers) at Chioggia inlet (2020) (https://www.mosevenezia.eu/)

Reading these episodes through assemblage theory, we considered in the previous section the diversion of the rivers to be a territorialising aspect, through which the aquapelagic assemblage aimed at maintaining its components in a sustainable equilibrium. However, this process resulted in turn into two main deterritorialising effects: the lowering of the level of the sea bottom and the rise of the level of salinity of the lagoon's waters. These changes can be considered the initiators of another phenomenon which threatens Venice also today: the *acqua alta*, or high tide. In fact, both the erosion of the city's foundations, the deepening of the lagoon floor due to industrialisation as well as the phenomenon of the high tied are today exponentially dangerous for Venice's fragile ecosystem. These three deterritorialising forces, coupled with an increase of sea level rise due to climate change, another deterritorialising force, have been faced through the construction of the mobile walls of the MOSE, in an attempt to re-territorialise the assemblage. Further changes in the morphology of the lagoon as well as in the biological ecosystem are two of the possible consequent deterritorialisation results derived by such a major infrastructure. The list below schematises the processes of (de)territorialisation:

- Diversion of the rivers (territorialising)
- Lowering of the level of the lagoon floor (deterritorialising)
- Rise of the level of salinity of the lagoon's waters (deterritorialising)
- Intensive extraction of subsurface water (deterritorialising)
- Sea level rise due to climate change (deterritorialising)
- MOSE (territorialising)
- Changes in morphology and species' habitats (deterritorialising)

In this section we attempted to read through assemblage theory two historical events which happened in the Venetian lagoon, namely the diversion of the main tributaries outside the lagoon and the construction of mobile barriers at the lagoon inlets to avoid the submergence

of the city due to high tide. The main aim was to allow for a different way of conceiving humans' relation to the ecosystem of the lagoon than the one deriving from the common linear historical account. In fact, whereas a linear account of history tends to focus on humans' actions and intentions as the main drive towards the unfolding of events, assemblage theory also recognises the effects of other assemblage's components (DeLanda, 2016). As Hayward also writes, in an aquapelagic assemblage "humans interact with a range of other actants - sometimes imposing their will and/or causing unintentional impacts, sometimes blocked, diverted or defeated by interactions and reactions of other animates, inanimates or manifestations of energy" (2012b: 4). These agentic processes of the aquapelago's components were considered in this article as processes of territorialisation and deterritorialisation, through which Venice as aquapelago acted on its components in order to periodically stabilise itself. As such, humans' actions were considered as part of the assemblage development, and not as its main constituents. In other words, both assemblage theory and the concept of aquapelago highlight how humans' interventions on the ecosystem of Venice can be placed alongside the interventions of other components: the tree trunks necessary for the construction of Venice, with their physical characteristics and their own amount of maintenance; the threatening presence of the debris brought by the rivers; the salt of the Adriatic Sea which erodes the city; the tide which washes away the lagoon's floor; the ground which for the high level of salt loses its firmness and collapses etc. In this context, humans' actions are but one of the many forces at play in the constant process of balancing and rebalancing the co-existence of heterogenous components in the assemblage of Venice.

In the following section we reflect more thoroughly upon the insights gained through the assemblage analysis. In particular, we pay attention to the ways in which humans' actions can be seen as reflecting a persistent tendency of rejecting water, of wanting to separate themselves from the element, although keeping these two elements unlimitedly divided would result in constant efforts of majestic territorialisation interventions.

Long-lasting engineering approaches and a "blue ethics" for the city of Venice

In our analysis in the previous section, we noted the following human actions in relation to natural elements: extraction of tree trunks, maintenance of foundations, emptying of the lagoon, diversion of rivers, pumping of groundwater and construction of mobile barriers at the lagoon's inlets. We showed how each of these actions resulted in consequential effects that, rather than being mere responses by humans, can be regarded as tendencies of the overall aquapelagic assemblage to reinstate a sustainable equilibrium amongst its components. In this section we note how the human interventions identified in the article so far could be seen as acting out of kilter with the equilibrium of other components in the assemblage. This human tendency of acting in ways that seem to work against the reaching of sustainable levels between the various components of the assemblage can also be explained through new materialist insights. In fact, this article argues that this tendency derives from the fallacious assumption that human practices can exist separately from the presence and practices of other creatures and natural elements (Haraway, 2016), which always act with humans in the overall assemblage's development. As the work of Bruno Latour underlines (1993, 2005), this is a result of the ephemeral dualism between the social and the natural realms present in our postmodern way of reasoning. The 'hard' interventions in an ecosystem as fragile as the Venetian lagoon can be read as the empirical effect of this postmodern mindset. In fact, as Madricardo et al observe, "extensive hard structures... are all likely to have long lasting effects on the sea floor ecosystem" (2019: 8). In other words, hard

coastal defences and hard engineering interventions, while giving the apparent feeling of solving problems once and for all, are nonetheless harmful in the long run.

One might ask at this point what alternative and 'soft' solutions are there for the city of Venice? One other proposed solution has been in the previous years to raise the city by pumping water into its underground (Gambolati and Teatini, 2014), resulting in an uplift of circa 30cm in a period of 10 years (the MOSE took 17 years so far, and still counting). As the authors of this solution write: "the infrastructures required to implement the uplift project appear to be environmentally safe, with little or no foreseeable impact on the lagoon ecosystem" (ibid: 75). Although it is surely beyond the scope of this article to praise one intervention over the other, it can be noticed how these two projects (the MOSE and Venice's uplift) stand on two opposite onto-epistemological grounds: the former is an engineering intervention resulted from a mindset of achievable human separability from the natural world, while the latter admits the unavoidable entanglements of humans and water and work towards their harmonic co-existence (Neimanis, 2017). In other words, the latter intervention is intended to facilitate the two components to inhabit the same space in ways that better connect human beings to the watery world. Scholars such as Beatly are at the forefront of infrastructural marine interventions aimed at merging humans and water in what he calls a "blue ethic" (2014: 103) of urbanism. According to him, blue urbanism auspicates to "profoundly reorient the human mind, polity, and culture in the direction of the marine world" (ibid: 163). In fact, through a change in the way in which humans relate to the watery world around them, it can become possible to recognise the intrinsic value and inherent worth of water and its preciousness and to begin to cultivate a long-term relation. Underwater parks, the construction of bluebelts and the redesign of waterfronts are few of the project advanced by scholars and engineers around the world that are delivering on Beatly's insights (see, for example, Ryu, 2020). At the basis of these projects there is a belief that experience-based connections with water in our cities and living spaces are critical elements for "reminding people that we are all citizens on the blue planet" (Beatly, 2014: 104).

For 16th Century Venetians transformations of nature and natural processes had deep moral implications. In fact, humans were thought to be intervening in God's creation, assuming for themselves the role of the demiurge (Cosgrove, 1993). Today, although technological intervention in the natural environment is certainly an important component of today's societal wellbeing, we can rethink the way in which technology and nature can work more fairly towards the maintenance of the equilibriums of the lagoon's ecosystem as co-relating components.

Conclusions

Through the adoption of assemblage theory (DeLanda 2006, 2016) as well as the concept of the aquapelago (Hayward 2012a, 2012b), this article proposed a different way of looking at Venice's historical relation to its watery world. In fact, contrarily to a common historical approach which considers Venice as made merely through humans' interventions (cf Lane, 2008), this article showed how these interventions could be considered not as the sole engine behind the unfolding of Venetian history but as actions among the action of other components within the aquapelagic assemblage of Venice. The article paid particular attention to two alterations of the ecosystem of the lagoon: the diversion of the main rivers in the 16th-17th centuries and the construction of the MOSE system in the 21st Century. As a result, Venice was firstly envisaged as an aquapelagic assemblage comprising of heterogenous entities (e.g. humans, natural elements, artefacts). Secondly, the assemblage

was conceived as emerging out of the interaction of these heterogenous components and evolving in time through processes of territorialisation and deterritorialisation (Deleuze and Guattari, 1987). Territorialisation is the process that gives an assemblage its defining boundaries and maintains those boundaries through time, while deterritorialisation is the process that decreases density among components, promotes dispersion or eliminates some boundaries. Through these processes, the assemblage of Venice was shown to act on its components in order to periodically stabilise itself. In this way, humans' actions were considered as part of the assemblage development but not as its main constituents. Interestingly, human interventions were showed to be actions aimed at stabilising the human side of the aquapelagic assemblage, although resulting in a broader destabilisation of the assemblage's other components. This counterintuitive behaviour, this article argued, derives from the erroneous assumption that humans could "hardly" separate themselves from the natural world they inhabit (Haraway, 2016; Latour, 1993). This tendency is also reflected in the engineering of walls and barriers, rather than the adoption of other types of interventions which would bring the two elements towards a more sustainable and longlasting relationship (Gambolati and Teatini, 2014; Madricardo et al, 2019), one that recognises the inseparability of Venice and its watery world.

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