

Maritime Summary Note n°273 – September 2025

« Venice : the culmination of a number of maritime challenges »

*An incomparable asset of European cultural heritage drawing an irresistible attraction for tourists from across the entire globe, **Venice** is confronted with a multitude of overlapping structural problems affecting Europe's coastal regions, ports, and historic waterfronts. Mastering the challenges of **overtourism (le surtourisme)**—driven in significant part by the cruise industry—adapting the port infrastructure and its associated industrial-port fabric to structural economic shifts, preserving its positioning within the European naval shipbuilding landscape, and safeguarding one of the most ecologically fragile environments in Europe, constitute critical dossiers that bestow upon the Venetian territory a highly singular positioning within the European maritime and port landscape. This comprehensive overview of the ever-evolving maritimity of the City of the Doges stems directly from the fieldwork and study tour organized by the "Fabrique de la Cité" in May 2025.*

An Exceptional Territory Engineered Across the Centuries

There exist several distinct geographic regions in Europe where land and sea interlace to form a mixed, hybrid space, the most remarkable being the continental coastlines of the North Sea and the northern reaches of the Adriatic Sea. Geography has engineered exceptional natural ecosystems that the hand of man has sequentially shaped. Depending on localized requirements, human engineering had to drain waterlogged expanses, embank and redirect river pathways, reclaim greenfield agricultural land, and construct dense urban fabrics. Over time, these initial coastal communities transformed into powerful merchant and maritime societies, operating—both in the Low Countries and in Venice—as indispensable commercial interfaces linking the open seas to continental landmasses.

As a distinct marine ecosystem, the Venetian Lagoon commands a relatively recent history, spanning approximately 6,000 years. Faced with the rampant threats of tribal invasions and military incursions during the 5th and 6th centuries through the strategic corridor dividing the Alps and the Adriatic, local populations sought refuge within the archipelago of islands and low-lying islets of the lagoon. Throughout the Middle Ages, an extraordinary city emerged—built literally upon the water, but also by the water.

Venice forcefully asserted itself through seaborne trade and mercantile macroeconomics as a first-rate political and military superpower. The urban republic transformed into a dominant thalassocracy, and under the banner of the Lion of Saint Mark, it imposed its hegemony across the Adriatic and the Eastern Mediterranean basin, successfully confronting the rivalries of Genoa, the Byzantine Empire, and the Ottoman Empire.

The monumental wealth accumulated by Venice directly materialized through its urban expansion. In its definitive architectural morphology, the city is established across two primary central islands bifurcated by the Grand Canal, flanked by the adjacent island of Giudecca. These urban spaces are themselves interconnected and subdivided by nearly 180 narrow canals, creating a mosaic of approximately 120 micro-islands.

Beyond this central core, the wider lagoon archipelago encompasses alternate urbanized islands (such as *Le Vignole*, *Murano*, and *Sant'Erasmo*), dedicated agricultural islands, an isolated island hosting a giant municipal cemetery, and others serving sequestered monasteries. Finally, the ecosystem is dotted by hundreds of natural islets and intertidal mudflats (*barene*), with the lagoon enclosed from the open sea by a series of urbanized sandy barrier islands (*lidi*).

Mechanically, within the Venetian archipelago, the daily mobility of individuals, retail merchandise, construction materials, and municipal waste is executed through a myriad of specialized watercraft. This high-density navigation generates severe environmental externalities, primarily wake-fraction hydro-erosion (*le moto ondoso*) that actively degrades both natural islets and the historical wooden pile foundations of the palazzi.

The public transport network alone displaces 148 million passengers per year via its fleet of waterbuses (*vaporetti*), a structural visual and acoustic icon of Venice just as much as the tourist gondola. Concurrently, the municipal transit authority acknowledges that it must, over the long term, initiate a comprehensive decarbonization of its marine operations.

Over several centuries, the City of the Doges, enriched by its maritime commercial economy, endowed itself with dozens of monumental palaces and churches, magnified by the reflection of the lagoon and canals. Politically, the *Serenissima* permanently lost its sovereign independence in 1797 under the military campaigns of Napoleon Bonaparte in Italy. Placed under Austrian rule from 1815 to 1866, and integrated into Italy thereafter, Venice transformed into one city among many within the newly unmapped, unified Italian nation.

Outside its architectural magnificences, it operated as a functional Italian city where water simply replaced roads and avenues—a "normal" urban hub with its diverse trades, civil servants, local merchants, commercial port, and military naval shipyard (the Venetian Arsenal). Venice counted a headcount of 150,000 inhabitants in 1900, escalating to 250,000 by 1930.

However, Venice has never truly operated as a normal city; it has functioned as a powerful cultural magnet for all of Europe. The European aristocracy long identified it as a prime theater for varied leisure. Wealthy British elites invented the educational continental journey, the "Grand Tour," which naturally positioned Venice as a mandatory destination.

Throughout the 19th century, the expansion of travel to emerging middle classes generated what became known as tourism, with travel guidebooks rigidly mapping out the steps—establishing Venice, alongside Florence, Rome, and Naples, as the ultimate Italian requirements of romantic wanderlust. During the second half of the 20th century, mass tourism in turn fell under the charm of this museum-city.

A Critically Fragile Ecosystem Facing Existential Threats

Venice operates as an urban agglomeration engineered upon the water; however, the historic island city counts today fewer than 58,000 permanent residents, while adjacent lagoon islands aggregate around 31,000. Within a sixty-year timeline, the historic center has shed two-thirds of its population, structurally relocated toward adjacent mainland urban clusters, most notably within the continental municipalities of Venice: Mestre and Marghera (176,000 inhabitants).

Symmetrically, the city absorbs between 80,000 and 100,000 tourists per day, translating into over 20 million visitors annually. Consequently, the city is progressively hollowing out of its inhabitants while being filled by transient tourist crowds. To be analytically direct, the local economy lives exclusively off tourism; its cumulative value-added and employment structures stem from this industry. Yet, this macroeconomic monoculture drives out the residential population, triggering a severe residential retreat and the erosion of urban normalcy to the benefit of a highly romanticized "heritage theme park" or, more prosaically, a terribly "Instagrammable" backdrop. In this regard, is Venice truly different from the historic inner-cities of Seville, Barcelona, Florence, or Amsterdam?

The primary fragile environment remains the physical city itself. This vulnerability is first driven by the continuous hydrodynamic impact of wake-fraction waves (*moto ondoso*) generated by thousands of motorized craft circulating multi-directionally through narrow canals. Second, it is threatened by the steady rise of water levels, which severely degrades the porous brick foundations of the historic palazzi.

These heavy structures rest on millions of wooden piles driven deep into the *caranto*—a compact, highly stable subterranean layer composed of clay, sand, and silt. The most acute, immediate threat manifests as catastrophic flooding induced by extreme marine surges, a phenomenon that poses a wider strategic question regarding the complex ecological relationship connecting Venice to its wider lagoon.

The Venetian coastline, framing the space between the vast alluvial delta of the Po and Adige Rivers and the alpine foothills of Monfalcone, features a series of distinct lagoons, notably Venice, Marano, and Grado. These ecosystems were engineered by the post-glacial transgression of the Adriatic Sea over the extensive alluvial plains formed by alpine river deposits.

The Venetian Lagoon stands as the largest configuration, commanding a surface area of 550 square kilometers. Crucially, only 11% of this space remains permanently covered by shallow channels, while 80% is composed of intertidal salt marshes, mudflats, and wetlands (*gronda lagunare*). It operates as an exceptionally rich biological sanctuary, hosting over 200,000 living species. Beyond this intertidal zone lie lowlands permanently drained by technical pumping networks (which mechanically accelerates soil subsidence) dedicated to intensive agriculture.

Centuries of heavy human engineering have thoroughly altered the face of the lagoon. A significant share of the regional alpine rivers was permanently diverted away from the basin to prevent infilling siltation. The coastal sandy barrier spit enclosing the lagoon was stabilized into a series of distinct islands, stretching from north to south: the Lido di Jesolo, Cavallino-Treporti, the Lido di Venezia, Pellestrina, Sottomarina, and Isola Verde. Concurrently, the original sea mouths connecting the basin to the open sea were consolidated and reduced to three specific inlets. To manage this hydrographic equilibrium, the Venetian Republic created the Magistrature of Waters (*Magistrato alle Acque*) in 1501, an institution that continues to operate today to regulate lagoon spaces and safeguard local economic activities.

The lagoon ecosystem has steadily regressed over recent centuries. Land reclamation schemes were initially driven by agricultural expansions prior to the engineering of massive modern industrial-port zones and airport infrastructures. Furthermore, deep groundwater pumping executed to feed landside agriculture and heavy industries has triggered a severe subsidence (sinking of the soil) across the lagoon floor.

Simultaneously, various coastal defense structures have restricted the natural influx of maritime sand, resulting in an artificial thickening of the outer littoral spit, most notably to the north at Cavallino. This sand deficit directly penalizes the natural accretion of the alluvial mudflats (*barene*), low-lying salt marsh islets that sit flush with the water surface. The *barene* occupied 277 hectares of the lagoon during the 17th century, contracting to 72 hectares by 1930, and hovering at a mere 43 hectares today.

Ecologists and marine engineers strongly mandate a comprehensive restoration of these *barene* to mechanically cushion the erosive friction of tidal currents and commercial navigation. Securing sediment retention across the *barene* is vital for the lagoon's survival; once eroded, they forfeit their critical hydro-regulating role over macro-tides and marine current velocities.

Nevertheless, within the collective perception of local populations and public institutions, the ultimate danger remains the *acqua alta*—the sudden, severe rising of the sea level within the lagoon that completely submerges low-lying urban areas. A storm surge elevating the water column by over a meter (reaching a historic record high of 1.87 meters) is triggered by the atmospheric conjunction of high-velocity maritime winds (the easterly *Bora* and the southerly *Sirocco*) paired with torrential rainfall pouring over the Veneto region.

The frequency of these *acqua alta* events has expanded exponentially since the 1970s, logging a threefold increase in flooding days coupled with heightened structural intensity. Consequently, anthropogenic climate change is directly put in cause: what historically operated as an episodic natural phenomenon has transformed into an overly regular, highly destructive, and costly crisis (inflicting €1 billion in structural damages during the single flood of 2019).

The systemic inundation of Venice's historic streets and piazzas is inherited as a mortal threat to the survival of the city. To hold back the sea, public authorities bypassed complex lagoon ecological restorations, opting instead for a binary, engineering-led closure mechanism: the MOSE system (*Modulo Sperimentale Elettromeccanico*).

Initially conceptualized during the 1970s and launched into active construction in 2003, this massive civil engineering infrastructure is composed of 78 mobile underwater gates pre-engineered to rise and close the three inlets of the lagoon. Since entering full operational deployment in October 2020 at a cumulative cost of €6.2 billion, the MOSE gates can completely isolate the lagoon from the Adriatic Sea in less than an hour, ensuring Venice is no longer submerged by standard *acqua alta* surges.

The Port of Venice and the Veneto Economic Dynamic

Consequently, Venice and its lagoon do not function as a frozen historical conservatory static in time. This coastline represents one of the historical pillars of the Italian maritime economy, having hosted one of the single wealthiest and most powerful merchant republics of the Mediterranean for over eight centuries.

As a sovereign maritime state structurally turned toward the sea, Venice was historically obsessed with securing and massifying its mainland supply chains (*terraferma*), primarily routing vital imports of grains, timber, and vineyard commodities. Today, this legacy is embodied by the Veneto region, which stands as one of the most prosperous, industrialized territories in Italy, powered by a highly dynamic fabric of small and medium-sized enterprises (SMEs) commanding a deeply entrepreneurial and fundamentally liberal economic spirit.

In terms of the 19th-century Italian port economy, Genoa occupied the absolute premier position, Savona captured its own boutique market, Livorno served the Tuscan hinterland, and Venice remained a functional gateway (accounting for 13% of national trade flows in 1900), primarily irrigating the small Veneto region which had only been integrated into Italy in 1866. The island city concurrently modernized its infrastructure

through a rail bridge link, introducing train connections as early as 1846, prior to deploying a modern port infrastructure in 1880 equipped with the *Stazione Marittima* and its grand tidal basin.

At the dawn of the 20th century, Venice could not operate as the modern, heavy industrial port mandated by Northeastern Italy. Within the Northern Adriatic range, Ravenna was located too far south, while Trieste was still Austrian territory and positioned too far east. Initial expansion projects evaluated blueprinting new basins directly south of Giudecca Island. This infrastructure dynamic was forcefully driven and managed by the city's economic interests within the macroeconomic framework of the Veneto region, which was entering a phase of industrial catch-up relative to the Po Valley.

In 1904, a revolutionary concept emerged: constructing a brand-new port complex directly on the adjacent mainland (*terraferma*). This strategy presented the immense operational opportunity to permanently rid the historical insular port of heavy, low-value, or hazardous bulk commodities, including coal, grains, and fertilizers, while safeguarding the *Stazione Marittima* to handle high-value breakbulk cargo exclusively. Orchestrated by the *Società Porto Industriale di Venezia*, the industrial site of Marghera was launched into active development starting from 1917. Several industrial basins were engineered along the lagoon shores, interconnected to the open sea via the dredging of a deep navigation channel cutting through the lagoon to meet the legacy maritime track servicing the *Stazione Marittima*.

This industrial expansion was rapidly fueled by energy requirements, beginning with electricity generation (a dedicated power plant) followed by refined petroleum logistics (oil storage depots). Since the close of the 19th century, the Second Industrial Revolution revolved around rapid advancements in industrial chemistry, metallurgical alloys, and complex manufacturing. Marghera was destined to operate as the Italian equivalent of Fos-sur-Mer, but with a thirty-year head start.

During the 1930s, the industrial cluster muscled up, commanding a dedicated surface area of 1,300 hectares. The entirety of modern heavy industry clustered within this zone, encompassing aluminum oxide smelting, metallurgy, chemical fertilizers, and specialized glass manufacturing.

Marghera operated as a true preconfigurator for the massive Industrial-Port Complexes that flourished across Western European gateways throughout the 1950s. Once post-war reconstructions concluded, Marghera captured its own massive oil and petrochemical development phase, driven by ENI and Montedison. To accommodate upsized drafts, a new deepwater channel—baptized the "Oil Canal" (*Canale dei Petroli*)—was dredged from the sea mouth of Malamocco in 1969.

This monumental industrial boom sustained a massive demographic exodus shifting populations from historic Venice to the mainland, where the new port translated into one of the physical icons of the "Italian Economic Miracle". However, this intensive development was not executed without severely contaminating the lagoon's ecosystem with heavy metals and forever chemicals.

Marghera concurrently stands as a paramount territory for naval shipbuilding. The industrial narrative debuted in 1917 with the establishment of the *Cantiere Navale Ernesto Breda*, which predominantly manufactured military surface combatants. In 1970, the engineering of a massive 335-meter-long by 54-meter-wide construction drydock unlocked the technical capacity to manufacture giant merchant vessels. Having transitioned under state-backed public control following World War II, the yard was integrated in 1979 into the state-owned group Italcantieri, which consolidated the shipbuilding sector across the entire Italian peninsula. In 1984, Italcantieri was comprehensively absorbed into its parent corporation, Fincantieri, itself a core subsidiary of the giant state holding company IRI.

Today, the Marghera industrial yard participates actively—alongside the sister sites of Monfalcone, Genoa-Sestri Ponente, and Ancona—in the engineering and manufacturing of next-generation **cruise** ships. This introduces a striking, fundamental Venetian paradox: the very territory that has masterminded a sweeping, high-profile geopolitical challenge against the environmental footprints of cruise tourism is identically one of the premier global industrial nodes where these giant mega-liners are built.

Several decades later, mirroring the structural trajectory observed elsewhere in Europe, nothing can be taken for granted. The industrial decline of port complexes has loomed as a permanent threat since the 1990s, continually accelerating with each consecutive macroeconomic crisis. The legacy, small-scale ENI oil refinery was permanently shut down in 2013 prior to being technically re-commissioned as an advanced biorefinery. Symmetrically, the industrial-port employment baseline of Marghera has severely contracted over recent decades, plummeting from 40,000 down to a low 10,000 salaried employees.

Consequently, public authorities are mandated to inject greenfield economic purpose into the zone¹. Moving along this path, the VEGA master project (*Venezia Green Engine*) relies on engineering a dedicated business and technological park tailored for non-industrial new activities.

In terms of raw freight throughput, the Port of Venice at Marghera² displays a high-performance, resilient diversified profile, logging 7.1 million tonnes (Mt) of liquid bulks, 7.3 Mt of dry bulks, and 9.7 Mt of general cargo, aggregating a cumulative 24 million tonnes handled in 2024. A greenfield logistical stream focuses on handling new vehicles manufactured by the *Volkswagen Group*, while the modern ro-pax ferry terminal at Fusina bridges the hub directly to Greece, displacing 62,000 international passengers.

Concurrently, containerized throughput reached 479,000 TEUs last year, establishing Venice nearly on par with the adjacent gateway of Trieste (535,000 TEUs). These physical container streams are operated across two terminals: one masterminded by Singapore's PSA International (acquired during its historic 1998 corporate expansion alongside Genoa) and the alternative facility managed by a stevedoring company operating within the corporate orbit of MSC.

Regarding hinterland connectivity, however, Venice's position for global containerization remains structurally restricted, exclusively irrigating the immediate Veneto territory. The Ligurian Sea port arc, stretching from Savona to Livorno, successfully drains the absolute bulk of industrialized Northern Italy, whereas Trieste—coupled with Luka Koper (Slovenia) and Rijeka (Croatia) across the Northern Adriatic range—stands significantly better positioned to irrigate landlocked Central European marketplaces.

Venice and the Geopolitics of Global Cruise Tourism

It goes without saying that the City of the Doges has fascinated humanity for centuries. A breathtaking beauty, exponentially multiplied in the era of digital network imaging, backed by an immeasurable cultural heritage stemming from 15 centuries of history—nothing more is required to attract millions of tourists annually. To be analytically direct, overtourism is fueled by globalized wealth, the mass proliferation of *Airbnb* short-term holiday rentals, low-cost commercial aviation, and, here and there, the cruise shipping industry. Just that within a highly compressed, insular island city, this floating architecture appears vastly more aggressive than anywhere else on earth. Without necessarily acting as an efficient tool to halt the flow, the Municipality of Venice implemented a day-tripper access tax (*Contributo d'accesso*) enforced across 54 peak days per year.

Returning to the cruise sector, Venice operates as the absolute cornerstone gateway upon which all high-value Adriatic itineraries are structured. What more magnificent choreography than admiring the museum-city from the upper decks of a mega-liner navigating at slow speed through the Giudecca Canal? What greater logistical convenience than facilitating an unassailable port-of-call directly flanking the primary historical squares of the city?

However, the running aground of the small cruise ship *Mona Lisa* in 2004, coupled with the violent collision of the *MSC Opera* against a quayside in the Giudecca Canal in 2019, operated as dramatic, high-profile wake-up casualties. These accidents revealed the extreme operational risks of routing giant marine vessels so close to the fragile historical center. Beyond navigational hazards, local protest groups (*No Grandi Navi*) challenge the severe environmental atmospheric pollution represented by the ships, the destructive role of their wake-fraction waves on foundation erosion, and their massive contribution to local overtourism.

Accused of placing the structural survival of Venice's historic core in mortal danger, large cruise ships were formally banned in 2021 from transiting through central Venice and making port-of-call at the *Stazione Marittima*. Henceforth, only boutique pocket-liners commanding a maximum 25,000 gross tonnage (GT) and restricted to a length of under 180 meters—essentially accommodating fewer than 200 passengers—are statutorily authorized to access the island terminals.

Consequently, mega-cruise ships have been permanently transferred to the industrial zone of Marghera, docked adjacent to the Fusina ferry terminal. In times of peak seasonal congestion, these giant floating palaces are handled directly along the commercial berths of the industrial-port area.

Henceforth, cruise ships are mandated to utilize the deepwater shipping channel routing through the Malamocco inlet, positioned exceptionally far from the historic center. Permanently gone is the breathtaking, jaw-dropping experience of discovering Venice from the towering upper decks of a mega-

¹ In the 2010s, a project that never came to fruition proposed an offshore port 14 km off the coast of the Lido

² In 2016, the number of Italian ports was slightly reduced, falling from 24 to 16 as part of a process of recentralization. The Port of Venice has been merged with its smaller neighbor, Chioggia, into the Port Authority of the Northern Adriatic Sea.

liner. Today, passengers face a completely standardized, sterile port environment isolated within the Fusina industrial zone, coupled with a significantly longer shoreside transit to reach Venice proper. Mechanically, the sector records a sharp, structural decline in cruise operations since the enforcement of this mandatory site reconfiguration. Global cruise conglomerates and itinerary planners display visibly less interest in marketing and selling Venice as a premier port-of-call. Consequently, the historical contribution of cruise shipping to the city's overall tourism economy has collapsed, plummeting from 9% down to a minor 3%.

Ultimately, safeguarding an exceptional monument-city while preserving the fragile lagoon ecosystem to the absolute maximum, maintaining a competitive port and industrial stronghold that actively feeds the coastal economy of the Veneto region, and strictly managing overtourism even if it requires forfeiting the immense windfall of cruise revenues—these constitute the existential challenges confronting Venice. In many respects, this interlocking triangle balancing environmental protection, cultural heritage preservation, and macroeconomic development operates as the common lot of numerous global port cities; Venice merely elevates these structural stakes to an exceptionally high, hyper-complex echelon.

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