iNEST – Interconnected Nord-Est Innovation Ecosystem: General Frame of the Project and Activities of Young Researchers at the University of Trieste

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Navigating the future: retracing 20th century inland and coastal mobility visions for the Friuli Venezia Giulia region

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↦ ABSTRACT

The coastal region of Friuli Venezia Giulia, stretching from the Tagliamento River to Muggia, presents a complex interplay between natural environments and human activities. Historically a crossroads between continental and Mediterranean Europe, it has long been shaped by water-based infrastructures such as the Litoranea Veneta. Twentieth-century plans by figures like Max Fabiani and Ernesto Nathan Rogers foresaw canals connecting the Adriatic to Central Europe and explored innovative relationships between urban growth, landscape preservation, and mobility. Today, amid climate change and rising sea levels, these visions could inspire renewed strategies for sustainable coastal and inland navigation.

A COMPLEX COASTAL TERRITORY

The coastal strip of the Friuli Venezia Giulia region extends west from the mouth of the Tagliamento River to the east to Muggia and the border with Slovenia. In a relatively short tract, around 110 kilometres, it includes extremely complex territorial contexts, which ongoing climate and meteorological changes subject to pressures and risks that variously add to those induced by a heterogeneous and often conflicting set of human uses and activities, protected and highly natural areas. This text intends to retrace experiences and design visions developed during the 20th century which –even if rarely realised– still represent precious references today for rethinking the functioning and habitability of areas destined in the near future to transform into increasingly amphibious environments due to the combined effect of rising sea levels and flooding caused by extreme events, erosion and subsidence processes.

Two main environmental systems can be recognized in the coastal strip of the Friuli Venezia Giulia region: the dry, rocky and steep area of Trieste and the Karst, and the lower Friulian plains extending from Monfalcone to Lignano Sabbiadoro, characterised by reclaimed crops, wetlands, lagoons and sandy beaches. It is with their specificities that projects for renewed land and coastal mobility, and more generally adaptation scenarios and tools, will necessarily have to deal.

A strategic question that emerges more and more clearly is how to be able to coexist with an increasingly consistent and variable presence of water in the coming decades and centuries, without giving up the vocation of this territory to represent a crossroads of movements and activities. For a long time it has in fact been traversed by important land communications routes and crossed by a dense network of natural and artificial waterways. Already in Roman times, the current Friuli Venezia Giulia region was innervated by the *Viae Postumia, Annia, Gemina* and *Iulia Augusta*, and a system of canals, known as *fossae,* connected the main cities of the Upper Adriatic, including Ravenna, Altino and Aquileia, structuring one of the most important exchange nodes between Italy and continental Europe (Dorigo, 1995; Medas, 2013). The importance of these routes lay not only in the transport of goods, but also in the movement of troops and in the connection between coastal cities and the hinterland.

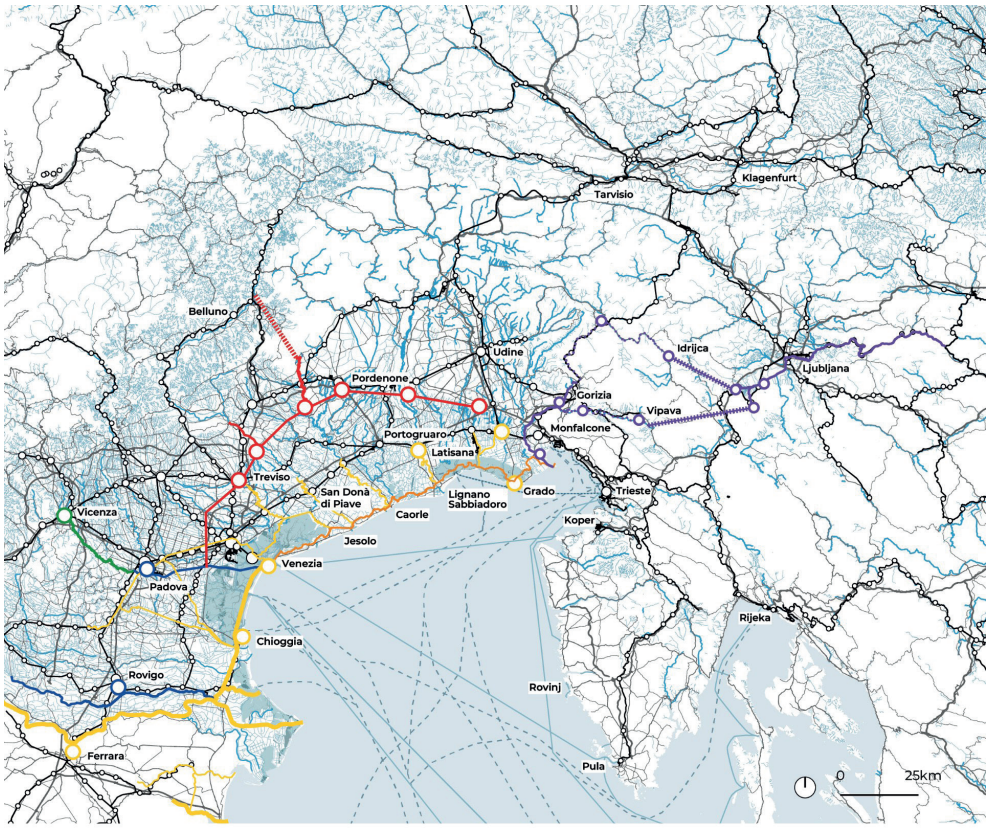
During the modern age, in particular internal waters became fundamental routes for the transport of goods, especially in the context of the commercial expansion of the Venice Republic. The network was progressively expanded, with the inclusion of new channels that increased connectivity between the region's commercial hubs. Following the fall of the *Serenissima* in 1797, the water network of the North-East remained abandoned for decades, to the particular advantage of the development of the railway. Only from the beginning of the 20th century did the Kingdom of Italy address the issue of internal navigability in a systematic way, appointing commissions to draft programs and draw up development plans and projects. Most of these remained only on paper, but the excavation of existing internal channels and new channels throughout the Upper Adriatic was implemented, giving rise, among other things, to a new route of strategic interest named Litoranea Veneta.

THE LITORANEA VENETA AND THE CROSS-BORDER CANAL PROJECTS

The Litoranea Veneta is in fact still today a system of water itineraries that extends for approximately 134 km and connects, parallel to the coast, Venice to Monfalcone. The Litoranea Veneta was classified until the 1950s as a second-class waterway according to the Classification of European Inland Waterways (CEMT) system, allowing the transit of vessels with a load of up to 600 tonnes.

Since the 1960s, the progressive construction of new road and railway infrastructures has relegated the Litoranea to a secondary role, mainly linked to tourism. However, several projects launched in those years sought to extend its navigability and integrate the waterway network with the new logistical needs of an area of Italy experiencing strong economic expansion (Figure 1).

A significant example is represented by the study of the Consorzio Idrovia Litoranea Veneta (1970), which envisaged a "double-comb" system: near the coast, through the maintenance of the Litoranea and the extension of navigability towards the north of the main rivers; further north, through the con-



Land mobility

- Railway line
- Platinum railway stations
- Gold railway stations
- Silver railway stations
- Bronze railway stations
- Highways
- Main roads
- Secondary roads

Water mobility

- Lagoon canals
- Brackish waters
- Sea
- Rivers
- Ditches and canals
- Local tourist routes
- International tourist routes
- International commercial routes
- Litoranea Veneta

Inland water mobility and ancillary infrastructure

- Existing or in the process or upgrade waterways for 1350 tons ships (1967)
- Existing or in the process or upgrade waterways and ports for 300-600 tons ships (1967)
- Waterways and planned ports *Idrovia Venezia-Treviso-Friuli Venezia Giulia* for 1350 tons ships (1967)
- Planned ropeway *Idrovia Venezia-Treviso-Friuli Venezia Giulia* (1967)
- Waterways and planned ports *Idrovia Padova-Vicenza* for 1350 tons ships (1967)
- Waterways and ports under construction for 1350 tons ships (1967)
- Waterways and ports Monfalcone-Ljubljana (1985)
- Waterway Monfalcone-Ljubljana with two alternatives: Idrijca e Vipava (1985)
- Tunnels Monfalcone-Ljubljana with two alternatives: Idrijca e Vipava (1985)

Figure 1
Upper Adriatic. The main waterway mobility projects, realised and not, conceived during the 20th century for the coastal strip and the hinterland. Source: elaboration by Ludovico Centis, Federico Vascotto, 2024. Data from: Vv.aa, 1985; Consorzio Idrovia Litoranea Veneta, 1970; IDT Veneto; IRDAT FVG; RFI

struction of a new canal that would have connected the Padua-Venice waterway with the port of San Giorgio di Nogaro, passing through Treviso and Pordenone, so as to guarantee the transit of cargo boats up to 1350 tons and a further connection towards the north with Cadore.

A few years later, the conference *Il collegamento idroviario Adriatico-Danubio* (The Adriatic-Danube waterway connection), held in Grado in 1984, probably represented the last public occasion of documented political and planning relevance for a discussion around the topic of navigation along internal waters on a territorial scale in the North-East (Vv.aa., 1985). In this Central European geographical context, numerous studies had been deposited over the centuries, from Leonardo da Vinci to Schemerl and Wagenführer under the Habsburg empire, then taken up again in the 20th century by engineers such as de Brai, architects such as Max Fabiani and Italian Slovenian groups in the late 1960s. Shortly thereafter, a meeting held in Ljubljana in November 1973, *Le vie navigabili e i flussi di traffico merci tra l'Area Danubiana e l'Adriatico Settentrionale* (The waterways and flows of goods traffic between the Danube Area and the Northern Adriatic), had as its objective the inclusion of these proposals in the economic agreements of the Treaty of Osimo of 1975 (Pozzetto, 1998, p. 375).

During the Grado conference, which was attended by the Italian and Yugoslavian Foreign Ministers, respectively Giulio Andreotti and Raif Dizdarević, the creation of a new canal system aimed at connecting Monfalcone to Ljubljana was discussed. Starting from the Panzano basin, near the center of Monfalcone, and going up the Brancolo collector to the Isonzo, one would have reached Ljubljana through an alternation of natural and artificial water segments. Two alternative routes had been imagined reaching the current Slovenian capital: the first through Gorizia and Idrijca; the second, further south, would have excluded Gorizia to travel along the Vipava river valley.[1]

This project resumed the long tradition of engineering reflections already started in the Habsburg era. Like the solutions imagined by de Brai at the end of the 1920s and by Max Fabiani a few decades later (de Brai, 1928; Pozzetto, 1998, p. 374), the two alternatives presented and discussed in Grado also included a tunnel section, essential to avoid crossing the Alpine mountain ranges. For this stretch, de Brai had gone even further, prefiguring a sequence of basins near Vippacco to compensate for a height difference of almost 200 meters in the Karst area. None of these proposals were ever realized: this does not mean that the imagined network –in its various versions– could undoubtedly have represented an important infrastructure for cross-border transport and the improvement of connections between Friuli Venezia Giulia and Central and Eastern Europe.

I→ GROWTH, LEISURE AND PRESERVATION IN THE TRIESTE METROPOLITAN AREA

While the ambitious 20th century projects of water mobility on a Central European scale insisted on plain, hilly and alpine contexts, Trieste and its metropolitan area –which extends into the Karst– required reasoning of a different nature. During the 1950's, a crucial decade in the history of the city, a series of plans were drafted by notorious architects and planners that reflected on the future development of Trieste and its surrounding territory. These plans engaged not only with urban growth, but also with the potential development of land-sea mobility in relation both to tourism and everyday commuting.

Just before the official return of Trieste to Italy in 1954, architect Max Fabiani conceived between 1953-54 *L'emporio di Trieste ed i suoi destini* ("The emporium of Trieste and its destinies"), a plan that responded to the potential growth of the population –referring to a forecast of 600.000 inhabitants– with the proposed development of a modern integrated mobility system from Monfalcone to Koper (nowadays in Slovenia), with the city of Trieste at the center (Pozzetto, 1998, p. 382). Fabiani's plan is still today particularly significant for the proposal to connect the hilly Karst hinterland of Trieste to its

1 Historical news and reflections on the Grado conference derive from the author's participation in the *Waters of Vienna* seminar, held by Pier Paolo Tamburelli and Anna Livia Friel at the Technische Universität (TU) of Vienna in December 2023.

Figure 2

Board included in Max Fabiani's 1953-54 L'emporio di Trieste ed i suoi destini ("The emporium of Trieste and its destinies").
Source: Archivio Tecnico del Comune di Trieste

more central areas with a system of chair lifts that would have reached a subway line stretching from north to south, from Porto Vecchio in the heart of the waterfront of the city to Koper (Figure 2).

Following the signature between Italy and Jugoslavia of the memorandum of London on 5 October 1954 that implied the division between the two states of the former Free Territory of Trieste, Fa-

biani's proposal became evidently inapplicable. In this new geopolitical context, in 1956 Trieste was included among the Italian cities that had to draft the new *Piano Regolatore Generale* (PRG) (General Development Plan). Already before the final approval of the PRG in 1962, it became evident and urgent the need to conciliate the desired economic growth –that included tourism– with the protection of the landscape, from the seashore to the Karst, that surrounded the city. The main outcome of this effort resulted in the *Piano orientativo per la riviera triestina* (Planning guidelines for the Trieste Riviera), drafted between 1957 and 1960 by Italian architect Ernesto Nathan Rogers with the collaboration of Luciano Semerani (Rogers, 1960). Commissioned by the Chamber of Commerce of Trieste, with the collaboration of the Municipality, the planning guidelines addressed a geographic area that spanned from Muggia to the mouth of Timavo river, looking at the tangled relationship between leisure, hospitality, natural and cultural heritage, economic investment and forms of mobility. The operation carried out by Rogers was innovative both for the territorial scale it addressed, envisioning an organic framework for planning the Trieste coast within the broader regional dimension, as well as for being one of the first examples of a sectoral plan. Responding in the first place to the agenda of the main proponent, the Chamber of Commerce, the planning guidelines addressed the conservation and enhancement of the coast mainly for tourism purposes. The main outcome of the effort led by Rogers resulted in a set of boards which highlighted the "values underlying the plan" –from the natural beauties of the landscape to the historical and artistic heritage– as well as in a "table of errors" recognized in the development of the territory. Following this analysis phase, the proposal evolved towards the goal of concentrating residents and tourists in well-defined agglomerations, equipped with all the main services and modern conveniences, preserving as much as possible a unique coastline and hinterland, punctuated also by a myriad of caves. Rogers and his team reflected also on the mobility network, including the proposal for a new 12 km coastal pedestrian promenade from Grignano to Sistiana, a cable car between the small port of Santa Croce and Monte Primo and suggesting an increase in sea connections, that were –and still mostly are today– scarce.

I→ A PRESSING AND TIMELY CHALLENGE

In the face of the intensification of global flows of goods and people, the coastal strip of Friuli Venezia Giulia is an increasingly strategic area. Characterized by a rich historical stratification, it has over time emerged as a crossroads of cultures, economies and peoples, playing a key role in the trade between Northern and Southern Europe. With its dense road and rail networks and infrastructure, commercial and maritime hubs, it constitutes a key gateway from Continental Europe and the Mediterranean to the Middle East and Asia, and vice versa.

In recent years, and following the strong expansion of the Port Network Authority of the Eastern Adriatic Sea –including the ports of Trieste and Monfalcone– and the land infrastructures that serve it, the topic of inland and coastal navigation has become timely again, driven by the need to reduce greenhouse gas emissions, find sustainable alternatives to road and rail transport and provide a response to possible emergencies such as the repeated fires that hit the Karst in 2022. In fact, waterways offer numerous advantages in terms of energy efficiency and reduction of environmental impact and could become an important element of the regional strategy to face the challenges of climate change, while improving tourist and daily mobility. In particular, the Litoranea Veneta could be strengthened to allow not only tourist transport, but also that of goods (Infrastrutture Venete srl, 2023). From this perspective, the network, which is currently used almost exclusively for pleasure craft, could be integrated with the port and logistics infrastructures of the Northern Adriatic from Trieste to Venice to create a multimodal transport system.

Despite the newfound interest and the need for infrastructure investments to redevelop existing waterways and adapt them to modern transport needs, significant challenges still exist for the full integration of inland and coastal navigation in sustainable mobility strategies. On the one hand it is funda-

mental in the context of the North-East to overcome the differences between the policies of the different regions involved. While the Veneto Region has expressed its desire to recover and expand the navigable network (Veneto Region, 2024), the Friuli Venezia Giulia Region seems to focus mainly on the development of coastal infrastructure, limiting itself to reiterating that the waterway network is made up of the Litoranea Veneta and related waterways (Regione FVG, 2017). On the other hand, after the decades of closure linked to the Cold War, the relatively recent expansion of the European Union to include Slovenia and Croatia should lead to reflection on far-reaching transnational projects, such as the one conceived by Fabiani for the Trieste metropolitan area in the 1950s, which extended from Monfalcone to Koper. Net of economic and geopolitical considerations, a further critical element is represented by the adaptation of the waterway system to the effects of climate change.

Sea level rise and coastal erosion are putting existing infrastructure under stress, making planning that takes these phenomena into account necessary. The construction of new land-sea infrastructures, the improvement of logistical services and the integration of inland and coastal navigation with other modes of transport are therefore among the main challenges for the future for the Friuli Venezia Giulia region, and in broader terms, for the entire Upper Adriatic.

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