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Design & Territory: Emergencies and Conflicts

Nélida Yaneth Ramírez Triana
John Jairo Cardozo Vásquez
Academic Editors



Dirección de Investigación y Extensión
Vicerrectoría
Sede Palmira



UNIVERSIDAD
NACIONAL
DE COLOMBIA

Serie ARTE Y ARQUITECTURA

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The Water Potential in the Design of the Territory. Three Cases Compared

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Chapter 4



This chapter develops an analysis on three design experiences carried out as a research group within the Department of Architecture and Urban Studies of the Politecnico di Milano following the positive outcome of participating in three tenders funded by the Cariplo Foundation on the territory of the Lombardy Region.

Starting from different requests and contexts, the projects find a common matrix in enhancing the potential of a territory related to the environment, through the recognition of ecological corridors, rivers, parks, and protected areas as a new connective system of territorial relation, in containing the consumption of soil, in proposing and redesigning a network of sustainable mobility, in underlining the historical features of the landscape as elements of essential identity.

The research were an opportunity to redesign pieces of territory through the water. While responding to different requests and referring to different contexts, the three projects find a common goal in enhancing the territory's characteristics. The watercourse is recognized for its ecological value as an environmental connector and for designing around it the promotion of ecosystemic instances, limiting soil consumption and tracing sustainable mobility networks, highlighting historical features of the landscape as essential elements of identity.

Multifunctionality, interdisciplinarity, and transcalarity are the keys to understanding the three projects that work around the theme of water.

In the first case, it is a fluvial redevelopment masterplan that assumes the Lura River as a resource for landscape enhancement and the containment of environmental degradation in the traversing stretch of Saronno town. Attention is paid to the fruitive aspects; public open spaces are defined, and a cycle-pedestrian path which, together with the torrent, constitutes an element of connection between the city and its periurban green areas.

The second case also structures a river redevelopment masterplan as a system of actions to enhance the open spaces in the Livescia River sub-basin. The purpose of the ecosystem recovery of the fluvial corridor and its continuity offers the opportunity to combine three municipalities, identifying critical nodes and valorizing the existing ecological realities.



The third case is a feasibility study for a new waterway, Canale Dardo, between the Villoresi Canal and the Naviglio Grande, as a concrete opportunity to create a naturalistic, hydraulic, and landscaping ecological connection. Through the renewal of degraded periurban areas, the promotion of ecosystem values strongly compromised, and the attention to the quality of the anthropic and natural landscape, the study is interdisciplinary thinking on the insertion of new infrastructure.

Introduction

Designing a territory shows a particular affinity and usefulness in its being associated with the theme of water. The scientific literature on the subject underlines the value of green-blue infrastructures. Water is an undeniable potential, offering design ideas for urban public spaces, open spaces, and landscapes. However, the most current and necessary interest in sustainable contemporary planning is given by the possibility of enhancing the virtuous symbiosis that, through the project, can derive from the relationship between green infrastructure and water. The opportunity to work on: ecological processes, biodiversity, the protection of what the regional planning already maps, recognizing an environmental value is created, developing ecological corridors, protected areas, community interest areas, and also working on territorial criticalities and fragilities. The exponential increase in urbanization, the end of a heroic industrial period, and the political gaps in environmental management have left profound signs in the territory.

Green, open, permeable spaces are residual (Clement, 2005) and destined to be absorbed in the urbanized areas that aggregate each other along the main connection arteries. In the same way, the natural watercourses, which should have a protection zone, have been used by industrial systems, diverted, and forced into covered concrete and artificial beds, wasting the ecological potential.

The contribution, centered on the role of water in the development of green infrastructures, regards different contexts: the torrent and its redevelopment in the urban fabric as a possible reconnection of a river park; the torrent and its connective capacity to recover and enhance the open spaces of its sub-basin; the possibility of assigning an ecological-naturalistic and fruition-landscape (not specialist, not functional) value to a new waterway.

All three experiences are research funded by Fondazione Cariplo following the positive outcome of a competitive tender and were carried out by a multidisciplinary research group of the Politecnico di Milano led

by Michele Ugolini. The three works had the support of the bodies involved in the specific territorial study and obtained positive and concrete effects on the urban planning of the interested municipalities.

The peculiarity of these experiences lies in the fact that they simultaneously have been able to range over a wide array of themes with a strong interdisciplinary approach. As a feasibility study, the works could respond to regulations or laws defining and delimiting their field of action without responding to regulations or laws defining and delimiting their field of action.

Breaking the rigid planning sector with which we usually act (traffic plans, cycle-pedestrian mobility plans, recovery plans, municipal regulatory plans, etc.) was possible by spacing and mixing various investigation and project levels and layers. Another peculiarity is that of subverting the relationship between plan and project by inverting it: to have used design exploration as an element capable of verifying and suggesting the assumptions necessary for planning.

These two starting methodological conditions (which we set ourselves as a working group) allowed us to start an effective multidisciplinary path with potential coordinated relapse capacity on the various planning levels.

Moreover, it made the planning choices more impressive. In the river redevelopment Masterplan of the Lura torrent in the stretch of the crossing of the inhabited area of Saronno, the consequence took place directly on the definition of the Territorial Government Plan (PCT), which has resumed directly, giving it mandatory and regulatory value, the definition of specific areas of transformation along the Lura torrent, called ARU (areas of urban reorganization and redevelopment along the Lura as urban redevelopment area. In the second experience, one of the most significant effects is linked to the semi-abandoned industrial area called Bombix from the early 1940s, located in Cadorago. The local PCT provided for the complete demolition of this considerable architectural interest site to replace it with a modest and anonymous subdivision plan of residential buildings. In this case, the design prefiguration allowed us to verify the possible spatial and organizational alternatives. It showed that the safeguard of the leading architectural features of the industrial plant was compatible with a transformation of the area and with a multiplicity of new functions to be inserted, which will allow revitalizing the place and preserving its memory and identity. It also showed that from an environmental, ecological, and landscape point of view, it is possible to recover the confluence between the Lura and Livescia streams in the open air. These prefigurations have become mandatory through a specific variant of the PCT and have been collected in a specific plan that regulates the vast Bombix



area in a completely new way. The study was the possibility verification of bringing the confluence between the two streams, Lura and Livescia, back into the open air. Landscape, environment, and river ecosystem can rediscover that lost symbiosis. This specific proposal has been included in a special plan that regulates the Bombix area and constitutes a variant of the master plan.

About the Dardo project, the feasibility study will be acquired by the administrations of the eleven municipalities involved, whose territories are affected by the passage of the new canal, safeguarding them from the risk of other future and different transformations, ensuring the ecological connectivity linked to the design of the new waterway.

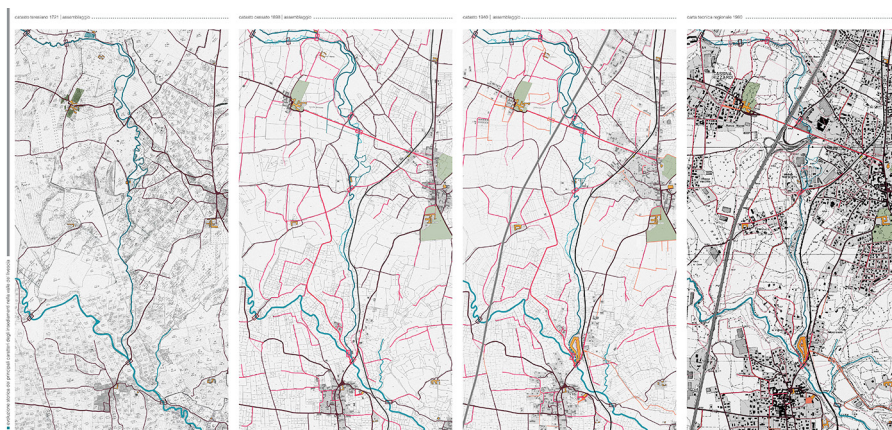
Methodology

Recent projects belonging to a shared contemporary panorama can confirm the different values of water: the potential to perform ecosystem and ecological services, to transform and reconvert large portions of urbanized territories, abandoned and polluted, to mitigate the fragmentation of the territory, opposing the isolation of still environmentally relevant parts.

It is worth emphasizing an interesting aspect that a waterway manifests in its being considered a potential green infrastructure: its unidirectional development, “passing” conformation, and “crossing” different territories. These characteristics allow us to immediately set up a multi-scale design that exploits the “binding” force of the water presence: the territorial one, with the benefit deriving from non-sectoral planning and not linked to administrative boundaries, the detail one linked to the study of places and the definition of the most suitable ecological strategies. Another important theme is the need to conceive a green infrastructure and the territorial transformations connected to it, based on ecological-environmental values, with specific attention to the implementation time, framing them within a medium and long design period. The ecological and water aspects linked to the morphology of green infrastructure are synergistic to be considered potential routes of territory use. On the one hand, it is associated with sustainable mobility planning; on the other, it suggests an informed and guided touristic way of exploring the reference context. These analytical and design features define the need to shape a multi-disciplinary and multifunctional project in which the ecological, hydraulic, and user-friendly connective value expresses the importance of a non-sectoral and non-specialized thought. The need for the project to establish efficient relations between urban space, rural context, and natural resources is highlighted.

All researches are based on the study of the actual planning tools, from the regional to the municipal scale, of the landscape protecting and safeguarding tools and the projects in the areas concerned. Moreover, a direct survey allowed us to verify the context to which the torrent is related. Further attention was paid to the historical transformation of the territory, starting from the first available documents useful to read the context through maps and historical land registers to understand its changing and the origin of its structures and signs, identifying elements of permanence and invariance, for this which has changed over the past four centuries, as seen in Figure 4.1.

Figure 4.1. Mapping the historical transformation of the territory from 1721 to 1980 following the existing cadaster maps: changes and permanences



Source: own work.

Green system projects related to the presence of water required analytical thinking on methods of approaching water, on the possibility of reaching the torrent, on the role, the physical and dimensional consistency of the banks, on the vegetational presence –declining a physical, visual or denied access–, mapping fenced areas, public and private areas, as seen in Figure 4.2.

Multifunctionality, Interdisciplinary in a Trans-Scale Methodological Mutual Link

The possibility to transform a waterway in a green infrastructure means to consider, according to Benedict and McMahon a multidisciplinary approach.



The connectivity intended as ecological issue is a long-term sustainable strategy. A balance between conservation and development.

The projects presented represent, methodologically, constant comparison with the context in which they are inserted. We assume the territory rich in signs stratified over time in continuous change, with its potentials and criticalities. Designing acquires a directing role of knowledge and disciplines that necessarily intersect in the process of transformative strategies. The project has the catalyst and unifying role of this articulated process of knowledge.

It is an interpretative and analytical procedure of knowledge never as a priori but in continuous evolution with the development of the project in a constant back and forth. Designing a new waterway or redefining an existing one, whether natural or artificial, requires a trans-scale and multi-objective project, as it entails configuring a relationship system. A waterway interfaces with the specificities of hydraulic engineering, mobility, the landscape, the environment, the ecosystems it passes through, agriculture, and the social and historical context. The constitutive territorial scale of the waterway is welded to the detailed one, and all the intermediate scales in the transversal and punctual definition of its section and the reconfiguration of the contextual specific relationships: efficiency of the irrigation system, qualification of agricultural open spaces, new paths for sustainable mobility, enhancement of the natural and anthropic landscape, development and protection of ecosystems through the creation of wetlands, integration and selection of vegetation, improvement, and creation of habitats, protection of fauna through the identification of guide species and introduction of barriers and faunal passages, protection, and implementation of ecological corridors, to mention some concrete actions.

According to the Schiaffonati words,

The Italian context sees a prevalent approach to the design of infrastructural systems that is titled towards engineering logics, [...] Accordingly, the mitigation project seems to refer only to what surrounds the infrastructure and turns into a mere cosmetic operation. (Schiaffonati, 2016, p. 17)

and it is true, considering the artificial waterway obviously, but also a river, intended as a hydraulic and hydrogeological matter.

To complete the method framework, it must be added that the design process with which all three projects are structured consists of several phases:

- The first phase of elaboration and co-planning aimed at defining a shared vision. In this phase, some project hypotheses

were investigated through interviews and audits of various technical and institutional actors (municipal administrations and specific offices, water resources, agriculture, urban planning, public bodies, parks, and protected areas, etc.) and the associative world from which the first ideas emerged.

- The second phase of interaction with the East Ticino Villoresi Consortium leaders, one of the leading institutions governing the irrigation and reclamation of agricultural land in the Lombardy Region.
- The third phase of actual interdisciplinary project development involved structured personnel and professionals from different curricular backgrounds.
- A fourth phase of the elaborated project hypothesis presentation and dissemination to the municipal administrations, the Bodies, and the Associations through a Services Conference, which has acquired useful contributions for the subsequent phase's development of elaboration of the work.

Lura as New Livable Urban Water Line in Saronno

The study area is located in Italy (Lombardia region), within the territory of Saronno municipality, in Lura Park, which stands between the cities of Milano and Como.

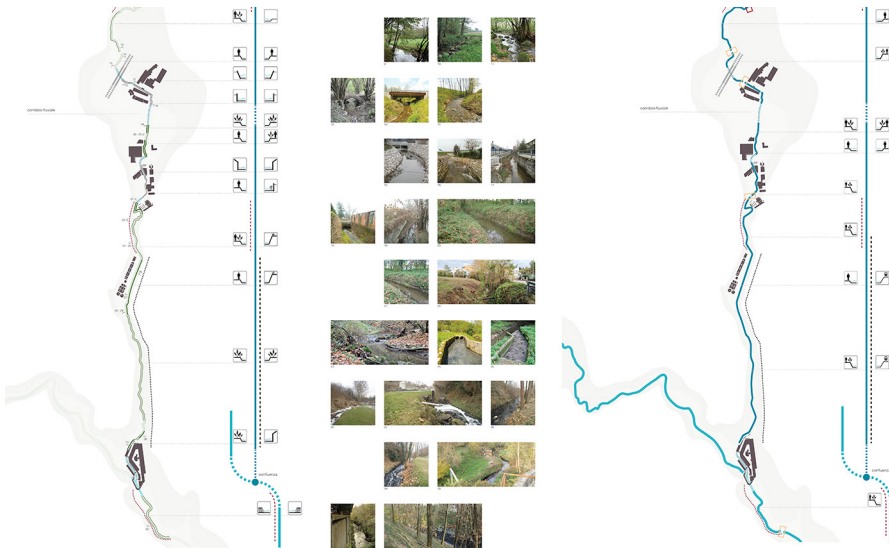
A particular methodology was studied with which the sequence of open spaces was identified, in the belief that enhancing a river within an urban context could constitute a form of natural regeneration and offer the opportunity to design habitable and welcoming places facing the water.

Generally, the peri-urban and urban areas near the rivers are destined to assume ever greater importance related to sustainable city development, reducing pollution, improving energy balance, and unifying landscape design. The research's general objective is to demonstrate how a system of open urban and peri-urban public spaces located along a river can be urban quality generators as well as landscape, environmental and ecological ones and how their continuity can restore a river corridor. The master plan aimed to guide the Park into the city through the river; the project proposes a virtuous and long-term integration between nature and artifice, between outdoor living places and places where the stream and its ecosystem draw the edges within which the man and his actions can enter.



The methods are multiple: the re-classification of urban spaces according to their eco-systemic potential (core areas, green corridors); the selection of additional surfaces potentially related to the green infrastructure functions; the definition of technological solutions and materials (artificial and natural) for their environmental recovery (impermeable surfaces, horizontal and vertical, bare soils); the provision of management practices of green spaces (urban gardening, urban agriculture, urban farming) consistent with producing new, artificial, nature conditions (Regillo, 2016, p. 16).

Figure 4.2. Mapping the water system, kind of banks, the relationship between the river and the man



Source: own work.

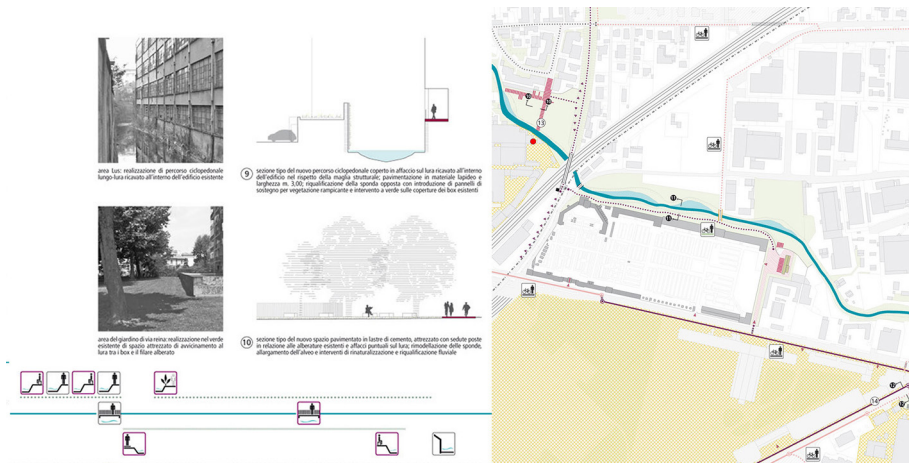
From a naturalistic point of view, the Lura River ecosystem crosses the Municipality of Saronno from north to south. In the Park, it is particularly heterogeneous and rich, while in the highly urbanized sections, the watercourse is impoverished, being forced between concrete walls or, for some stretches, completely underground. In this way, the river's self-purifying capacity and the function of ecological corridor between areas of high biodiversity are altered. Therefore, the inhabited center currently represents an element of ecological fragmentation where it is necessary to urgently intervene to redevelop the degraded areas and safeguard the interconnection gates still

present along the river and in the peripheral areas. The need to evaluate the functionality of the ecological corridors, untouched by the urban expansion of the last decade, emerges, establishing fundamental strategies of protection and strengthening in those areas exposed to the risk of artificialization to guarantee the continuity of the green system of the Lura Park, in defense of maintaining a balance in terms of compatible environmental loads.

The masterplan has defined a new design of the Lura waterfront in the 4 km crossing Saronno town, renewing the river-city relationship, improving its accessibility and its recognizability, constituting a continuous system of urban green and open spaces with multipurpose features, reachable and usable thanks to an integrated network of routes for slow mobility. As seen in Figure 4.3, some guidelines have been outlined that can assume the overall homogeneity features of the spaces and, at the same time, to grasp, reveal, and define, up to the small scale of the furnishing project, the peculiarities that each area proposes as its own, reinterpreting time by time the theme of the relationship with the river, as a possibility of places differentiation.

In some situations, where it was possible, pedestrian and cycle paths along the riverfront were proposed, directly related to the artificiality of the stream banks and the city that overlooks it, with the natural condition of the riverbed and its water.

Figure 4.3. Some guidelines for overall homogeneity



Source: own work.



It has yet to be renounced to face the subject of the river, even in its most difficult degradation conditions. In some cases, the river was covered underground, bringing it to light and significantly changing the character of the surrounding places. In other cases, it was not possible to recover the open physical condition directly, even symbolically recalling its presence with signs of water on the surface. Sometimes, where it was not directly accessible, the design work was carried out proposing the recovery of privileged points of view from which it was possible to look at the waterway, catching the opportunity to give back to city green areas or urban squares qualified.

They are spaces in which the intervention aims to realize a new and different connection between the historic center and the river, the periphery and the park, to obtain another way of living and inhabiting public spaces. Therefore, the future of these areas is not entrusted to the simple safeguard from the building but to the recognition and consolidation of high public and social value as well as landscape and ecological value, studied in detail as seen in Figure 4.4.

Redevelopment Master Plan of Livescia River

Containment of landscape degradation and land consumption in the valley of the Livescia River are among the objectives of the master plan, starting from a study and mapping of all the open spaces of the municipalities crossed by the Livescia torrent. Together with this, the aim was to create a shared strategic scenario for the redevelopment and enhancement of the open areas of the sub-basin. The study was co-funded by the Cariplo Foundation, supported by the Como Province and the Lombardia Region, D.G. (General Direction) Environment, Energy and Sustainable Development, in partnership with the Municipalities of Cassina Rizzardi, Cadorago, Fino Mornasco.

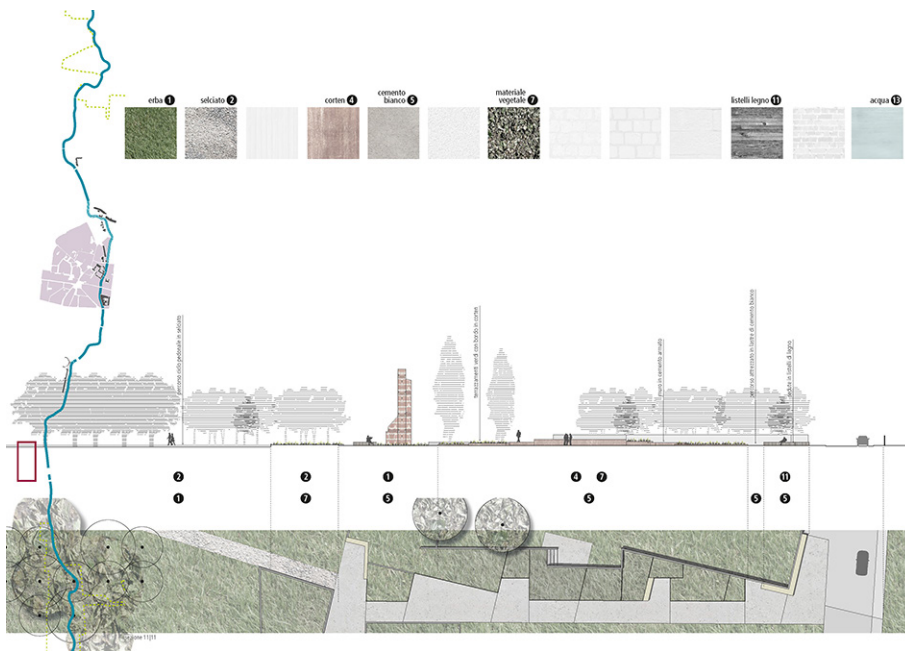
The research takes part in the “Olona-Bozzente-Lura River Contract,” aiming to the eco-systemic recovery of the river corridor.

Some specific in-depth studies have been prepared: one on the confluence of the Livescia stream and the Lura torrent within the former industrial area Bombyx in the Cadorago Municipality, discovering it and enhancing its contextual peculiarities for years covered by the now-abandoned factory; one within the Municipality of Cassina Rizzardi, on Villa Porro Lambertenghi and the relevant open spaces as a historical sign of the territory linked to the Livescia torrent.

The main aim of the research was the protection and continuity of the river corridor. By identifying some critical nodes, actions were promoted,

within the redevelopment masterplan, to report the centrality of the issue of safeguarding watercourses in the policies implemented by local administrations. A supra-municipal design reading has allowed us to highlight some critical issues, such as the welding of urbanized parts, the construction of essential infrastructures such as the A9 motorway, a new and invasive articulated road network, and to draw up a whole project for the river areas protection. The torrent and its natural and landscape potentials have represented a lively engine capable of triggering a system of relationships of paths, re-developable areas, buildings, or open spaces to which an identity needs to be reassigned. The waterline of the Livescia becomes an opportunity to design its valley belt and the whole neighboring or connected territorial system.

Figure 4.4. Designing open public spaces along the river



Source: Graphic elaboration by the authors

The mentioned objectives relating to all urban and periurban residual open spaces and especially in the river area, fall within the specific interest of the Territorial Development Framework Agreement of the “Olona-Bozzente-Lura River Contract,” which provides the redevelopment of water and



river areas through complex and multi-purpose projects. It was a matter of restoring naturalness and space to the river, making it the central element of the urbanized territory, enhancing the characteristics of the context by the fruitive aspects, and establishing connection elements with the various ecological realities present or planned. The need to evaluate the functionality of the ecological corridors that have remained intact since the urban expansion of the last decade has therefore emerged, by establishing protection and enhancement strategies in those areas at risk of artificialization that are fundamental in the continuity of the Lura Parco green system, in defense of maintaining wide gaps in the built environment and a consequent balance in terms of compatible environmental loads.

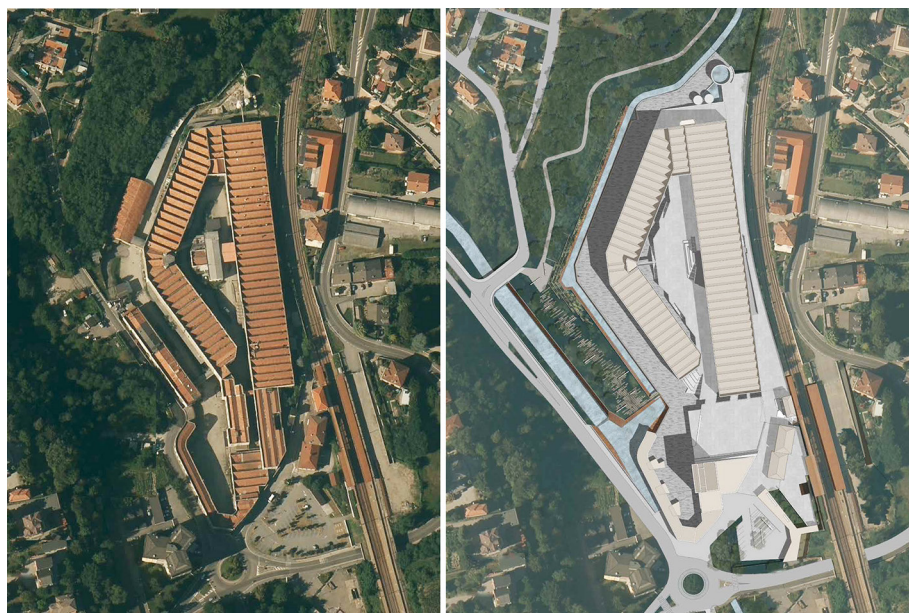
In setting up a green infrastructure around the environmental recovery of the Livescia valley, the node of the confluence of the two rivers, Lura and Livescia, of which historical maps reading made it possible to trace the shape and the characters, in their naturalness, was particularly important until the early twentieth century.

In the last fifty years, the two torrents have undergone substantial modifications and a progressive loss of that natural character of which they could still be witnesses. The urbanization of the 40s, with the construction of the Bombyx industrial complex, captures an economic potential in exploiting the valley terminal, the presence of water, and the railway line. On the other hand, the natural landscape of the Lura and Livescia valleys changes completely at the base of the hill on which Cadorago stands, covering a conspicuous stretch of the river and their confluence. The area enclosed by the sides of the valleys, by the presence of the railway and the road that connects Lomazzo to Fino Mornasco, is one of the most complex, heterogeneous, and articulated nodes along the Livescia. The Lura and Livescia streams have a fundamental role in defining the ecological and environmental heritage of the territory and, in the consequent mapping of the Province Coordination Territorial Plan (PTCP), as a tool for protecting and safeguarding the Como landscape.

The emerging aspects of the provincial ecological network fundamental elements are the Lura torrent, classified as Second level biodiversity source acting as a hinge of the ecological system that is articulated from the north, in the Bulgarograsso territory, to continue in the Lomazzo territory heading south and branching eastwards, towards Cermenate through the passages defined as ECS (Second Level Ecological Corridors). The area has a naturalistic-environmental-landscape interest of strategic importance because even though it is an urbanized area, it is part of a territorial context to be pro-

tected related to the two torrent ecosystems. A safeguard theme for restoring ecological continuity is reopening the two streams in the now-buried section below the Bombyx plant. As seen in Figure 4.5 and Figure 4.6, all the requalification interventions are in the masterplan framed within this design mode.

Figure 4.5. & 4.6. Transforming the node of the Bombyx industrial site: before and after discovering the confluence of the rivers



Source: Graphic elaboration by the authors

DARDO Working Waterlines. An Ecological Hydraulic and Fruitive Connection between the Villoresi Canal and Naviglio Grande

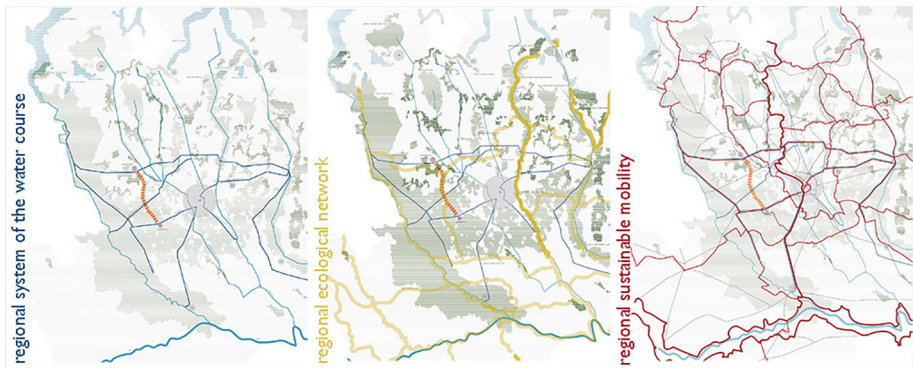
The work is a feasibility study for designing a multifunctional, naturalistic, ecological, hydraulic, and publicly usable connection, selected within a funding call of the Cariplo Foundation dedicated to the theme of “ecological connections.” The proposal was selected and was developed in close collaboration between the Consorzio di Bonifica Est Ticino Villoresi, an important institution for the irrigation management of the water system of Lombardy (Navigli) and Politecnico di Milano, in particular a research group of the Department



of Architecture and Urban Studies. The occasion arose to solve the need for water in the southern areas of Milan, essential to maintain its agricultural vocation. The main purpose was to design a large portion of the territory through the water, drawing a 21 km long DARDO Canal between the Villoresi and the Naviglio Grande ones, also outlining a new ecological corridor with an average variable section of 300 meters, where we developed, in addition to a hydraulic connection, a connection for the public fruition that innervates the territory by gathering its broad potential.

The Naviglio Grande, the oldest of the great Navigli system and, since the Middle Ages, source of the agricultural and commercial wealth of Milan and its territory, still maintains a fundamental irrigation character. Through time, in the long flow of its waters from Ticino to the heart of Milan, it acquired an important ecological and environmental value as well as a public one, linked to leisure and tourism to discover the landscape features of the periurban agroforestry system. The Villoresi Canal, conceived by Eugenio Villoresi and completed at the end of the nineteenth century, is the last of the great Navigli system. It was built essentially for irrigation purposes and is still the backbone for the irrigating of the agricultural land in the north of Milan. With its 86 km, it runs in the west-east direction, coming from the Ticino waters (Panperduto dam) and reaching up to the Adda river, flanked by a cycle path that connects the system of the Lombardia river-parks transversely and making the canal, as well as a powerful hydraulic infrastructure, also a precious ecological and environmental connection, a landscape way, framing in the green V'Arco Villoresi system. The primary aim was to confirm the multifunctional nature of the connection in all design choices derived from multidisciplinary analysis, as seen in Figure 4.7.

Figure 4.7. Three-way of reading the territory



Source: own work

More specifically, we tried the following:

- to strengthen the system of Regional ecological connections between the territories located to the north-west of the city of Milano and those to the south-west;
- to counteract the intense soil consumption in environmentally prized but already infrastructured areas in Milano's west part.
- to support the important agricultural vocation of the southern territories of Milano, giving enough water.
- to link the important and crowded cycle paths of the Villoresi Canal and the Naviglio Grande (green-blue ring) and to extend the network of local routes in a north-south direction.
- to connect the Eurovelo 5 route (London-Brindisi) to the west of Milan with the Vento Eurovelo 8 (Cadiz-Athens) route: from Como to the Villoresi Canal and from the Naviglio Grande up to the Naviglio Pavese and the Po River.

Despite being an intensely built place, the studied territory is dotted with important naturalistic areas. These protected areas represent a series of different environments, and they can support and attract various animal species (permanent, migratory, nesting). Implementing effective ecological networks occurs by reconstructing multifunctional green infrastructures associated with agricultural areas.

The project defines a wide and long ecological corridor (DARDO) that runs on one of the main paths of the Ecological Regional Network. Inside this corridor, the project's buffer is pinpointed with an average width of 300 meters (length 21,5 km) to favor the reconstruction or the permanence of environmental unities. Hedges and rows—linear elements of vegetation—together with masses and wooded strips are an outstanding presence in the agroecosystem.

As well as constituting a path for animals that shun open spaces, they are shelter systems for organisms moving through the surrounding matrix, represented by cultivated fields. Above all, the narrow corridors are frequented, by the typical open spaces or margins species. At the same time, hedges can host the species most closely related to shady environments and generally a richer and more complex living community.

In the project buffer, defragmentation interventions, such as underground passages and mitigation elements for the fauna, concretize the continuity of the green in the presence of transversal infrastructures. The conformation

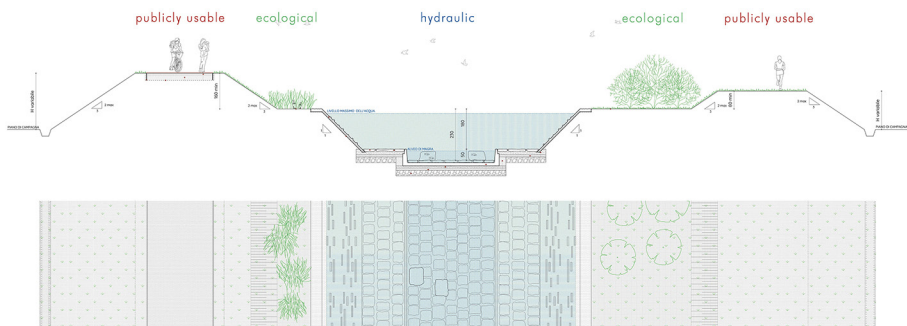


of the wetlands and the introduced basins includes banks with gentle slopes and steps of different depths easily colonized by wild flora and fauna. These habitats favor the reproduction of the amphibians and are suitable for nesting and feeding of flora and fauna.

The DARDO project buffer is associated with a section profile canal that fulfills all three connections within itself: the ecological-naturalistic, hydraulic, and public-usable ones. The section, as seen in Figure 4.8, proposes, along the entire length of the canal, also in correspondence with new bridges, two shrub bands of ecological continuity drawn by different widths and a permanent band of ecological continuity for fish characterized by a *savanella* as a smaller riverbed during the winter months. Here, some stones are placed to constitute elements of slowing down the current, allowing shelter for the fish. The higher jumps, which characterize the course of the canal, are equipped with ascent stairs also designed for fish. All the new bridges along the secondary roads, farm routes, and pedestrian/cycle lanes are equipped with animal passages to ensure ecological continuity in the east-west direction.

The new waterway alternates between stretches of trenches, and pensile stretches and runs for a long time following the traces of the existing canals and only partially on new lands. From the hydraulic point of view, it is important to underline how the multifunctional methodology allowed set up the water flow of the new canal to revitalize the historic irrigation system of the springs, called ‘fontanili,’ no longer active due to the lowering of the groundwater level caused by the processes of urbanization that led to a high-water intake and by the construction of the North West Canal (Canale Scolmatore di Nord Ovest, CSNO).

Figure 4.8. Section containing the multidisciplinary approach



Source: own work.

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