

From historical railways to cycleways. Re-functioning the heritage of linear monuments

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ARCHITECTURE HERITAGE and DESIGN

Carmine Gambardella

XVIII INTERNATIONAL FORUM

Le Vie dei
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World Heritage and Contamination

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Conference report 300 abstracts and 650 authors from 44 countries:

Albania, Arizona, Australia, Benin, Belgium, Bosnia and Herzegovina, Brasil, Bulgaria, California, Chile, China, Cipro, Cuba, Egypt, France, Germany, Georgia, Greece, India, Italy, Japan, Jordan, Kosovo, Lebanon, Malaysia, Malta, Massachusetts, Michigan, Montenegro, Montserrat, New Jersey, New York, New Zealand, Poland, Portugal, Russian Federation, Serbia, Slovakia, Spain, Switzerland, Texas, Tunisia, Turkey, United Kingdom.

Preface

At the state of art, with profound pride I register that the previous editions of the Forum 'Le Vie dei Mercanti' have favored the creation of an international community with over six thousand researchers, distinguished professors, institutional and business sector representatives from more than one hundred Universities and Research Centers from countries in the world. The XVIII edition of the Forum titled 'World Heritage and Contamination' aims to create a cross-critical dialogue, open to cultural contamination and 'without limits', in a logic of integration between competences which extends, and is not limited to, the following disciplines: Architecture, Culture, Environment, Agriculture, Health, Landscape, Design, Territorial Governance, Archeology, Economy, e-Learning. The activities of protection and promotion of World Heritage, understood as a asset shared by all Humanity, are particularly relevant in Italy, responsible towards the world of custody of the largest number of assets protected by the UNESCO. To the World Heritage Properties is added a landscape heritage of enormous variety and beauty to be protected also through the regeneration of degradation and of the 'minor heritage', in line with the provisions of the UNESCO Conventions on material and intangible assets as well as the European Landscape Convention. In this framework the multidisciplinary topics of the Forum represents a 'thing tank' of confrontation, exchange and cultural contamination oriented towards the United Nations Millennium Development Goals. The location of the Forum is of excellence. Campania Region with six World Heritage Properties, two Unesco Man and Biospheres, three assets registered on the Intangible Heritage List is one of the richest Regions in the world for cultural and landscape heritage, particularly 'contaminated' by Mediterranean cultures. No coincidence that the Forum takes place in Naples and Capri, with site visits and presentations of research and operational projects by the Benecon University Consortium, consisting of Italian Universities, head of my UNESCO Chair on Landscape, Cultural Heritage and Territorial Governance. The papers, selected by the Forum's Committee, will be published in the Proceedings of international relevance. Furthermore, the most innovative research and projects will be published in the 'Quaderni' of the A Class international magazine 'Abitare la Terra / Dwelling on Earth'.

*Prof. Carmine Gambardella, General Chair XVIII Forum
UNESCO Chair on Landscape,
Cultural Heritage and Territorial Governance*

Con profondo orgoglio, allo stato dell'arte, registro che le precedenti edizioni del Forum 'Le Vie dei Mercanti' hanno favorito la creazione di una comunità internazionale costituita da oltre sei mila ricercatori, distinguished professors, rappresentanti istituzionali e del settore dell'impresa provenienti da più di cento Università e Centri di Ricerca di cinquanta paesi nel mondo. La XVIII edizione del Forum 'World Heritage and Contamination' si propone di creare un dialogo critico trasversale, aperto alle contaminazioni culturali e 'senza limiti', in una logica di integrazione fra le competenze che si estende, e non si limita, alle seguenti discipline: Architecture, Culture, Environment, Agriculture, Health, Landscape, Design, Territorial Governance, Archeology, Economy, e-Learning. Le attività di tutela e promozione del Patrimonio Mondiale, inteso come bene condiviso da tutta l'Umanità, sono particolarmente rilevanti in Italia, responsabile nei confronti del mondo della custodia del maggior numero di beni tutelati dall'Unesco. Alle Properties del World Heritage si aggiunge un patrimonio paesaggistico di enorme varietà e bellezza da tutelare anche attraverso la rigenerazione del degrado e del 'patrimonio minore', in linea con quanto previsto dalle Convenzioni Unesco sui beni materiali e immateriali e dalla Convenzione Europea del Paesaggio. In questo framework i topics pluridisciplinari del Forum rappresentano un 'thing tank' di confronto, scambio e contaminazione culturale orientati verso gli Obiettivi di Sviluppo del Millennio delle Nazioni Unite. La location del Forum è d'eccezione. La Campania con sei siti iscritti nella lista del Patrimonio Mondiale, due Man and Biospheres Unesco, tre beni iscritti nella Lista del Patrimonio immateriale è una delle regioni più ricche al mondo per beni culturali e paesaggistici, particolarmente 'contaminata' delle culture del Mediterraneo. Non a caso il Forum si svolge a Napoli e Capri, con sopralluoghi e presentazioni di ricerche e progetti operativi a cura della Consorzio Universitario Benecon, costituito da cinque Atenei italiani, sede della mia Cattedra Unesco su Paesaggio, Beni Culturali e Governo del Territorio. I paper, selezionati dal Comitato del Forum, saranno pubblicati negli Atti di rilevanza internazionale. Inoltre, le ricerche e i progetti più innovativi saranno pubblicati nei 'Quaderni' della Rivista internazionale di Classe A 'Abitare la Terra/Dwelling on Earth'.

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CARMINE GAMBARDELLA

UNESCO Chairholder on Landscape, Cultural Heritage, and Territorial Governance; President and CEO of Benecon SCA RL University Consortium - Research Centre on Cultural Heritage, Ecology, Economy (University of Campania "Luigi Vanvitelli", Pegaso University, University Federico II of Naples, University of Salerno, University of Sannio). Full Professor of Drawing at the Pegaso University and at the University of Campania. President of the International Forum "Le Vie dei Mercanti" since its first edition in 2003 to the XVIII edition in 2020. Editor and Founder of the series "Surveying is/or Project", "Knowledge Factory" and "Architecture, Heritage and Design". Component of the Scientific Committee of International Class A Magazine *Abitare la Terra/Dwelling on Earth* (Gangemi Editor International Publishing). He covered various roles for the University of Campania, including the Pro Rector of Institutions, Academic Senator, Director of the Department of Architecture and Industrial Design Luigi Vanvitelli, Dean of the Faculty of Architecture Luigi Vanvitelli, Director of the Department of Culture of Design, Director of Doctoral School in the Discipline of Architecture, Coordinator of the PhD in Protection, Safety and Representation of the Environment and Structures and Territorial Governance, Coordinator of the PhD Program in Surveying and Representation of Architecture and the Environment. He is author of numerous scientific international papers, publications and proceedings on surveying and representation of the built and natural heritage.



World Heritage and Contamination

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From historical railways to cycleways. Re-functioning the heritage of linear monuments

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Abstract

This paper proposes a reflection on the relationship between historical infrastructures and cycleways. In Italy, with the Law 2/2018, rules have been provided for the development of bicycle mobility and the creation of a national cycleway network. The recovery of historical infrastructures is particularly promoted. Among these, disused railway lines reveal a specific vocation for cycling reuse. Unlike highway infrastructures, whose design is bound to parameters that imply a substantial autonomy from the landform, historical railways show how the project of territorial infrastructures can stage the architectural geography of anthropic and natural landscapes. Moreover, recovered in view of slow mobility usage, they appear as linear monuments capable of restoring the identity and stratified memories of the territory.

With particular reference to the international cycleways longitudinally crossing the peninsula, along the Apennines, this paper focuses on the description of the architectural characteristics of several historical railway infrastructures, selected according to different geomorphological contexts. Aim of these slow mobility infrastructures is also to contribute to the revitalization of 'inner areas' of the peninsula.

The knowledge of historical infrastructure is, in fact, assumed as a prerequisite for the design of cycleways that are able to relate to the territories and the multiplicity of their settlement forms.

Keywords: Architecture, Cycleways, Historical railways, Landform, Mapping

With the Law 2/2018 Italy starts a planning process of its national cycleways network. This law intervenes to bridge the gap between Italy and other European countries in the supply of territorial cycleways. The "EuroVelo" trans-European cycle network system prefigures three itineraries along the peninsula, none of which are currently in operation (in regard to Italy). Faced with the challenge of providing travel continuity to territorial cycleways, the law identifies several criteria that also aim to enhance the existing infrastructural heritage. With particular reference to this relationship between cycleways and historical railway, this essay proposes three strategic issues within the framework of the strategic criteria described in the Law 2/2018. The first issue concerns the functional versatility of the railway infrastructure, or its ability to integrate new functions related to cycle use (without losing its territorial architectural identity). A second issue concerns the relationship between the form of the infrastructure and the landform with reference to the experience of cycling. Finally, a third issue, that is crucial in view of relaunching depressed areas of the Italian territory, concerns the relationship between railway/cycling infrastructures and settlements, or, more precisely, the role of the station as a territorial interface between settlements and urban public spaces. Then, a final note, in light of the previous arguments, proposes to consider historical railway infrastructures as linear monuments, therefore as useful reference in order to face the architectural and territorial project of new cycleways.

1. Functional contaminations. The recovery of historical railways for cycling

Among the criteria employed in the plan of a national cycleways network (named "Bicitalia"), the Law 2/2018 includes several categories of infrastructures aimed at being recovered for cycling purposes. These are: waterways, such as banks of rivers, streams, lakes and canals; minor roads with adequate

characteristics to guarantee the cycling transit; sheep tracks, abandoned or downgraded roads, forest roads, service roads and minor roads; abandoned railways and other linear infrastructures like aqueducts, energy networks, sewer pipes, dismantled bridges and other road construction. What emerges from this list is a depiction of the variegated character the cycleway network can assume along its development. Thus, it may happen that, at first, the cycleway develops alongside a canal and then moves on a traffic-free road and finally connects to an abandoned railway line. So, unlike infrastructures for vehicular or railway use – characterized by a uniformity of characters (and surfaces) – the cycleway inherits a multiplicity of characters from diverse typologies of infrastructures.

This essay presents several results of the research "Geografia e infrastrutture territoriali nell'architettura delle Ciclovie" (GITAC – eng.: Geography and Territorial Infrastructures in Cycleways Architecture) [1] and provides a focus on works done on the subject of historical railway infrastructures and cycling.

In the next sections several modalities of functional relationship between cycleway and railway infrastructure are classified. In order to set up the classification, three categories of re-use are employed, namely: 're-functionalization', 'co-functionalization' and 'intermodality'.

1.1 Re-functionalize. From historical railways to greenways

Many historical railway lines have been abandoned since the end of the 19th century and throughout the 20th century in Italy. In the overall, they amount to about 7000km (including former concession lines). Recent publications edited by Ferrovie dello Stato show that a huge work of re-functionalization for cycling uses is ready to start, even though pretty late if compared to other countries. For instance, the United States began, already in the 1960s, a process of conversion of disused railway lines into cycleways that today amounts to 2000km and other 13500km planned to be achieved soon.

The concept that identifies the result of this conversion process is the 'greenway'. Even though there is not a shared definition of this concept it can be provisionally defined as a system of routes dedicated to a gentle and non-motorized circulation, capable of connecting populations with both local resources (natural, agricultural, landscape, historical and cultural) and urban settlements (either in cities and rural areas). In addition, as stated by the President of the European Greenways Association: «the reuse of disused railways as greenways exploits several peculiar features of railways, like being uninterrupted, regular and modest slope as well as interconnected with other public transport services» [2].

In Italy, Ferrovie Italiane made an inventory of disused railways that is published with the title "Travel atlas along disused railways" [3]. It shows that the current number of greenways built on disused railways is about 800km, so far. As such – considering that re-functionalization not only allows to develop sustainable mobility networks but also preserves the memory and historical value of infrastructures – it is clear that there is still a huge and urgent work to be done.

Railway dismantling is usually due to three main reasons: political choices – giving priority to road transport –, accidental events – such as earthquakes and collapses – and projects of track variations and high-speed railways. In Italy, few dead branches have already been re-functionalized and work nowadays as cycleways. Among these, an example is offered by the cycleway built on the former railway between Nogara and Tavernelle in 1887 and closed in 2008 on the occasion of a track variation aimed at doubling the Bologna-Verona line [4]. So far, just a short span of this track has been turned into a greenway. Nevertheless, the project foresees an entire recovery of the line for a total amount of 55km of new cycleway. In addition, even though the contamination between railways and cycleways will hopefully result in the preservation of the former railway, four stations – and other small warehouses – are ready to be refurbished.

Actually, the re-functionalization process is particularly urgent in relation to the oldest railways, dismantled in the first half of the twentieth century. Due to stratifications – and occupation of new buildings following cadastral re-parceling – old dismantled lines are disappearing more and more. An example that can be mentioned is the Velletri-Colleferro line, opened in 1862 and closed in 1963, which was originally part of the first Rome-Naples connection [5]. Fifty years afterwards, only a few sparse signs of the old railway remain, as well as several abandoned buildings. Nowadays, the need for a cycling connection between Rome and Frosinone might become the occasion to evaluate the preservation of such line. Otherwise it will be lost as many other lines that constitute the infrastructural heritage of the peninsula.

1.2 Co-functionalize. The integration of railway and cycleway

So far, we have seen how cycling can trigger the preservation of railway heritage – otherwise destined to disappear – by replacing an old function with a new one. In this section, we deal instead with the case scenario of partial replacement, which is defined 'co-functionalization'. Cycleways that develop on the service roads of canals, or rather along operating aqueducts, shows that cycling can integrate infrastructures without compromising their functionality.

In the case of railway infrastructures, co-functionalization concerns stations and other buildings when tracks remain operative. Usually, this happens when a railway turns from passenger service to freight service. And this functional variation causes the abandonment of stations and other annexed buildings (toilets, warehouses).

In addition to railways for freight transport, co-functionalization represents a good strategy also in relation to lines closed due to accidental events, or rather due to a drastic reduction of the network. This scenario involves at least 3500km of potential lines that are ready to be turned into cycleways. In such cases, co-functionalization appears as a possible strategy of preservation that employs the cycleway as a temporary use in view of a possible (even though unlikely) railway re-activation.

An interesting case study is Piedmont, a region where the spread of railways is much more evident than elsewhere with 710km closed to traffic, or partly dismissed, lines. The railway Saluzzo-Cuneo turned from passenger service to freight transport in 2012. The vocation for this railway to be co-functionalized for cycle-tourism – as part of the EuroVelo 8 cycleway – was demonstrated with a recent master's degree thesis in Architecture discussed at the Politecnico di Torino [6]. The co-functionalization project pays particular attention to the recovery of abandoned stations along the tracks in view of becoming service points of the cycleway developing throughout the countryside, though keeping adherence to the railway [Fig. 1]. Furthermore, considering railway stations as part of the municipal territory, the co-functionalization represents an occasion to strengthen the relationship between railway and rural settlements. In short, co-functionalization represents a way to re-address the 'dead' elements of a railway to cycling purposes, while keeping the track (i.e. the 'organism') alive.

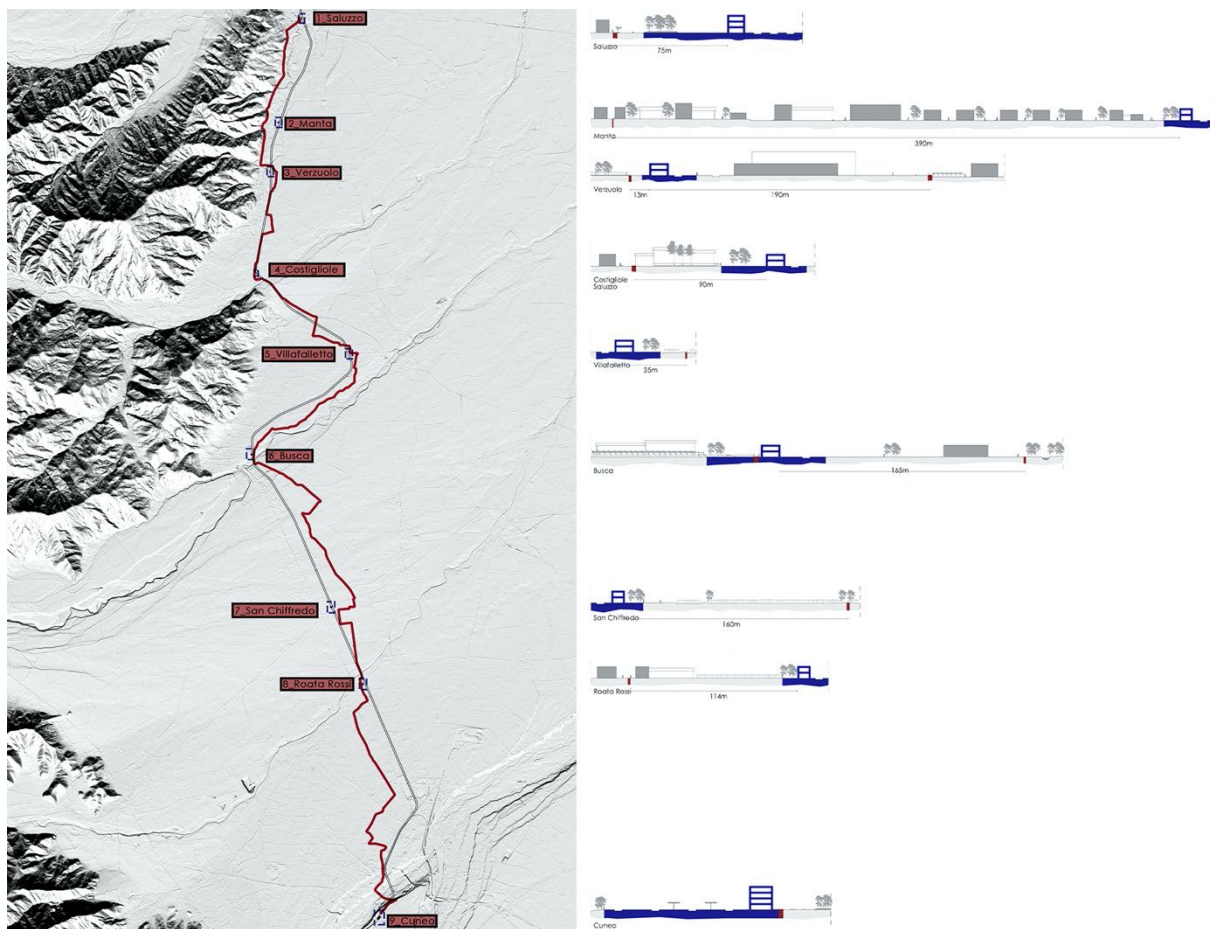


Fig. 1: Map of the landform with the project of the cycleway (in red). On the right: cross sections highlighting the relationship between cycleway (red) and train stations (blue). Graduation thesis in Architecture of Stefania Ghiotto, *Stazioni impresenziate e binari ferroviari dismessi: un problema che diventa un'opportunità. Riqualificazione dei manufatti ferroviari lungo il tracciato Saluzzo-Cuneo con affiancamento di una pista ciclabile*, Politecnico di Torino, a.a. 2018-19. Thesis supervisors: Chiara Occelli, Riccardo Palma.

1.3 Intermodality. The exchange between railway and cycleway

The last of the three modes of functional contamination between historical railways and cycleways is 'intermodality'. It stands for the possibility of a transit exchange between the cycleway and the train. The cycle-traveller must be offered the opportunity to plan part of his journey by train, ship, bus, or other public means. This choice arises not only in terms of itineraries but also in terms of equipping the cycleway with landing places for reasons of rescue or supply.

Unlike the two previous categories (re-functionalization and co-functionalization), intermodality does not imply a total or partial disposal of a railway. Cycling intervenes as an integration to an infrastructure in operation. It offers a new source – and typology – of users.

The importance of equipping cycleways with interchange points among different traffic lines is identified in the strategic guidelines of the Law 2/2018. Here, particular attention is given to the possibility that the cycleway offers points of «integration and interconnection with infrastructure networks to support other modes of transport as well as with other cycle networks in the area» [7]. Basically, intermodality initiates the project of cycleways to become part of a wider traffic network consisting of roads, railways, ferries, airports, etc.

Furthermore, the strategic nature of these interchange nodes is underlined by the possibility of giving these places also the character of cycle-stations, namely: «cores for the secure storage of bicycles, technical assistance and rental services, located near airports, railway stations, bus stations, underground stations and stations for maritime, river and lake transports» [8].

For instance, intermodality appears particularly useful in the crossing of the Alps for untrained cycle-travelers that would otherwise renounce to undertake the journey. The presence of railways in operation allows cycle-travelers to continue their journey by means of trains equipped for loading bicycles. In this sense, the cycleway is not seen as an alternative to the railway but rather as its strengthening. Moreover, it can provide an operating continuity to the so called 'tourist trains' established with Law 128/2017 aimed at «safeguarding and enhancing the railway sections of particular cultural, landscape and tourist value, which include railway tracks, stations and related works of art and appurtenances, and historical trains authorized to travel» [9].

Another Alpine example of intermodal interaction between cycleway and railway is offered by the Bernina train which is located on the trajectory of the EuroVelo 7 cycleway, at the crossing point between Italy and Switzerland – reaching a maximum altitude of 2253m. Inaugurated in 1910, this narrow gauge railway line connects Tirano with Sankt Moritz, and is included in the UNESCO World Heritage List since 2008 [10]. Reaching Tirano from the south, after having traveled the Valtellina cycle and a pedestrian path, the cycle-traveller can face the intermodal interchange by boarding on the Bernina train and continue his journey towards Chur in Switzerland.

2. Geomorphological contaminations. Infrastructure forms and landforms

While in the previous section we dealt with the relationship between cycleway and historical railway from a functional point of view, in this section we move on to features related to geomorphology and landform. In addition to be a useful resource for cycling, the railway line maintains a relationship with the landform, which differs from other infrastructures (i.e. canals and roads). Due to its specific features the narrow-gauge railway is more suitable for cycling re-use. Moreover, by flowing on a former railway line, the cycleway is able to introject both the distributional and structural features of the railway as well as providing the cycle-traveller with an extraordinary perception of landscapes – namely the same experience that was once perceived by train-travellers. In the next sections of this essay, we will see how the cycleway can embed the railway features and enrich itself with a multiplicity of stimulus triggered by the landform (a steep slope, an unexpected turn, etc).

2.1 The specificity of railway lines compared to other linear infrastructures

If we analyze the map of an alpine place, the presence of historical railways is marked by sinuous lines that change direction many times in order to cope with the slope. Generally, at stake is a narrow-gauge line, namely a typology of railway featuring smaller distance between the rails resulting in a decrease of the track radius. The narrow-gauge line portrays a greater adherence between the railway layout and the landform and, moreover, it allows a decrease of artefacts like tunnels and bridges.

Compared with roads, narrow-gauge lines are remarkably different. In the Italian network, narrow-gauge lines have maximum slope values (for extremely tormented mountain stretches) of 3.5% with tracks curvature around 250m of radius – with the exception of several extreme narrow-gauge lines (such as the Circumvesuviana) with 80m of radius [11]. In the case of road routes, accepted slope ratios are of 15% and 20m radii. And this theoretical difference between roads and railways produces very different configurations while faced with landform. Narrow-gauge lines show fewer changes of direction than the road and this difference appears even more marked if, instead of roads, the comparison is made with hydraulic infrastructures. For instance, canals feature a 1% slope that implies following the development of a level curve throughout the territory also by means of bridges, siphons and other devices that allow to overcome obstacles [12].

Among the multiplicity of infrastructures lines (railway, road, hydraulic), narrow-gauge railways offer excellent compatibility with cycling. This is due to many reasons, namely: affordable low-slope lines and continuity allowed by bridges and with short sections in tunnels that can be easily reused for cycling. Moreover, such lines have been largely dismantled throughout the 20th century when the rationalization of railway networks ended up with the primacy of normal-gauge and high-speed railways.

Among interesting examples of cycleways on abandoned narrow-gauge railways is the Alpe Adria cycleway spanning between Udine and Tarvisio line, dismantled in 1985, following the project of a new double track fast railway. The historical narrow-gauge railway dates back to the mid-19th century with the aim to connect Vienna with Venice, passing through Udine [13]. From Udine the railway develops

northwards through the valley of the river Fella in Carnia until it reaches the town of Tarvisio just before crossing the border with Austria. The historical railway portrays a particularly tortuous configuration if compared to the newly built railway developing almost entirely in tunnels, in the north side of the valley [Fig. 2]. It crosses the river Fella in areas where the meander changes direction more suddenly: it jumps from one bank to another of the riverbank differentiating itself from the other lines that populate the place featuring a more regular layout (the river, the road and the new railway line). Hence, by following the former narrow-gauge railway – along its development in the valley – the cycleway also embodies the line of the riverbanks. Therefore, the cycleway reproduces the landform of the valley.

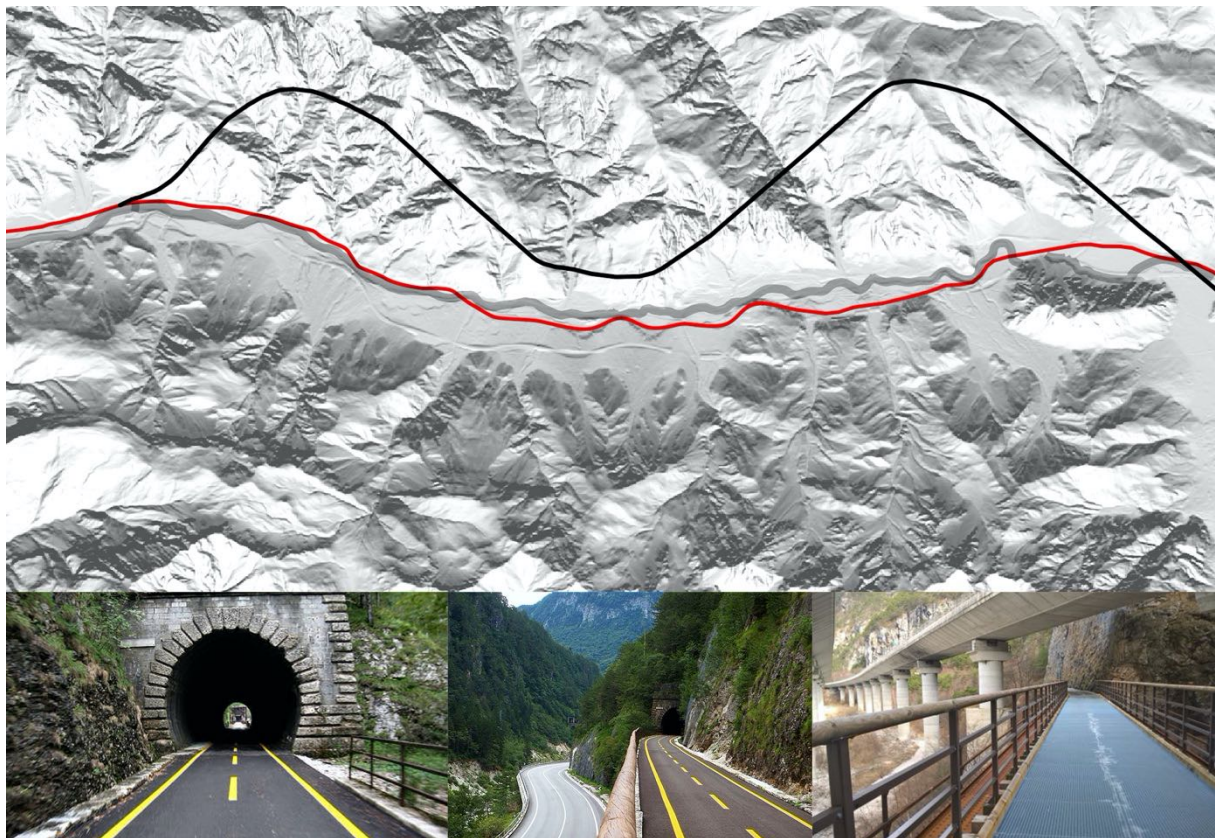


Fig. 2: Map of the Alpe-Adria cycleway (red) on the former narrow-gauge railway Udine-Tarvisio, with indication of the new railway (black); the cycleway follows the embankment of the river Fella and dialogue with road infrastructure.

2.2 Elements of the historical railway

In order to keep slope within a range allowed by narrow gauge technology, the railway faces geomorphology by means of technical artefacts such as bridges and galleries. Actually, the track bed itself is the main one of these artefacts. It consists of a trapezoidal section seating on the natural ground and hosting a platform where rails are anchored. In order to comply with slope constraints, the section can appear both as an excavation or an addition to landform. The section of the track bed is therefore an architecture, bound to a precise geometry – which conforms to the shape of the train and the number of tracks – but above all it is a land architecture. In other words, it is an artefact that integrates itself into landform to the point it appears as a corrugation of the soil. And such landform architecture becomes pretty evident when tracks are dismantled, and the track bed appears in its purity.

Other elements are instead limited to short or very short sectors of the railway. These are bridges and tunnels, namely artefacts that express the true points of contrast between geomorphology and railway line. Such artefacts – in the case of narrow-gauge railways – are short enough to allow being used for cycling. And this happens not only in the mountains but also in plain geographical contexts – like the Po valley – crossed by a dense texture of waterlines requiring a good amount of bridges.

The presence of artifacts like bridges and galleries, represents nowadays a precious resource in view of cycling recoveries of railway tracks. Unlike road routes, railways are uninterrupted paths that keep the cycle-traveller safe from conflict points with cars and others traffic flows. Moreover, it is precisely due to such artefacts that the railway is able to express landform in a quite spectacular way by taking advantage of ‘catastrophic conflicts’ between geomorphology and infrastructure. As stated by Riccardo Palma, the expression of ‘catastrophic knots’ refers to the Greek concept of ‘catastrophe’ which in Greek dramaturgy means the highlight point of the plot [14].

The presence of artifacts sometimes arouses the memory of a track despite the fact it is not – or it has never been – there. This is the case of railways that had a very short life or that were suppressed in the bud. An example is the line between Sant'Arcangelo di Romagna and Urbino (1909-33), never fully realized [15]. What remains nowadays are just several bridges, viaducts and tunnels built just before the railway project was abandoned [Fig. 3]. Such ruins represent the memory of a line that was never built and that can find a new potential continuity through a new cycleway enabling to join the ruins.



Fig. 3: Ruins of the Sant'Arcangelo-Urbino railway. From the left: Bridge near Schieti, Gallery accesses in Verrucchio and Poggio Berni.

2.3 The experience of landform along the EuroVelo 5

The experience of traveling on abandoned railway lines is also the experience of places. It is not just about visual perception (the view from the train window had a significant influence on the popular construction of the railway imagery) but also of motion perception. Traveling by bicycle on an old narrow-gauge railway means varying the effort according to the slightest changes in slope, distributing weight while changing direction, feeling wet and dry air, etc.

The visual experience cannot be dissociated from thermodynamic balance (while crossing a tunnel, for instance) and in energy consumption. This balance results from geomorphological variation that intervenes along the route. Therefore, due to its variable geomorphology, the Italian peninsula is a place where such variation in balance is particularly felt. Crossing the peninsula from north to south, the cycle-traveler will face at first the alpine sectors by taking advantage of disused (or historical) railways, he will go through the Po valley, then he will face slopes again in the Apennine and finally reach the coasts of Apulia.

This variety of experiences can be virtually described by selecting several examples of already reused railways placed along this cycleway.

In the Alps we find the example of Val Brembana cycleway joining the city of Bergamo with San Pellegrino Terme. The former railway was inaugurated in 1906 and dismissed in 1966 [16]. The path is very suggestive due to its variety of landscapes and is characterized by the presence of many bridges and tunnels with variable stretches and slopes. Ranging between 8m in length of the Ghisleno tunnel and 187m of the Morla tunnel, carved into the rock, such artefacts produce visual suggestions accompanied by a multiplicity of experiences and perceptions along the way.

Going down to the Po valley, the Emilia-Romagna region offers examples of the Modena-Mirandola railway built between 1883 and 1884 and closed in 1964 [17]. This railway features a long straight line in the open countryside comprised within two waterlines, already turned to greenway for 45km [Fig. 4]. Unfortunately, the track is partially obliterated but its presence persists thanks to rows of trees and a particular change of colouring left on the ground.



Fig. 4: The straight line in the plain of the former railway Modena-Mirandola (red), recently re-functionalize as cycleway.

Going up towards the Apennines, the railway Spoleto-Norcia is another line being recently turned to cycleway [Fig. 5]. The 50km long line was inaugurated in 1926 and closed in 1968 and portrays the typical tortuous configuration of a narrow-gauge railway [18]. Nowadays it offers to the cycle-traveller a surprising variety of geomorphological experiences and artefacts such as tunnels, like the Caprareccia

tunnel with its 2km of length (the longest one along the path), helical tunnels and viaducts that allow the experience of the particularly bumpy orography of the Apennines.

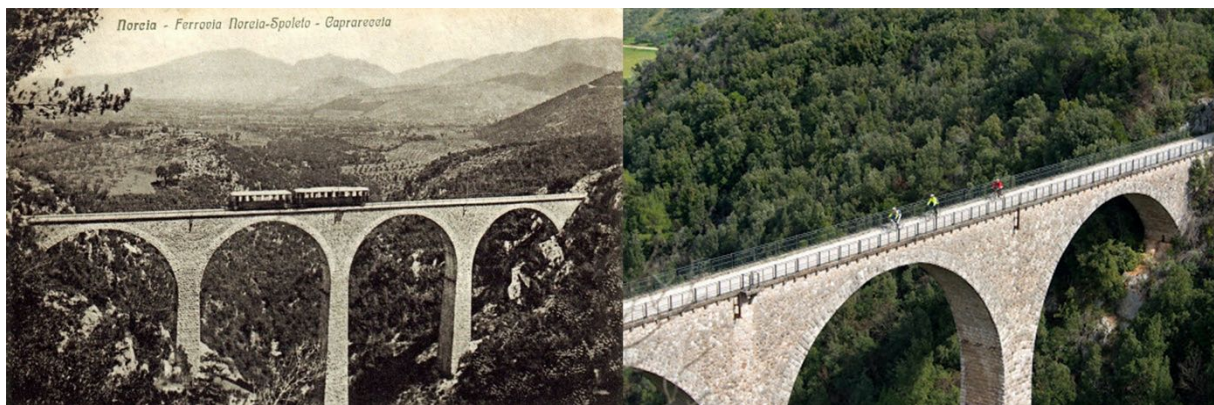


Fig. 5: The Caprareccia bridge of the former narrow-gauge railway Spoleto-Norcia, around the 1950s and nowadays.

Going further south towards the coast, the geomorphology is more relaxed. In Apulia we find two former railway lines built in the mid-nineteenth century, decommissioned a century later, and today partially recovered as greenways. Placed in sequence with a gap of about 10km, they are the Bitetto - Acquaviva delle Fonti and the Gioia del Colle – Palagianello – this last place not far from Taranto and the coast of the Ionian Sea [19]. Skirting the Murge plateau, the first of the two former railways crosses a rural area characterized by olive trees and vineyards. The second is instead characterized by the presence of the *Gravine* – particular geological features carved in limestone rocks by meteoric waters – which are overcome by long viaducts that (together with the track bed) are still armed though and waiting to be turned to greenways soon, hopefully.

3. Typological contaminations. Re-enacting railway stations

In the Italian case scenario, together with 1400km of dismissed railways tracks and 400km more converted into greenways, 491 stations have been re-functionalized to enrich the service availability for both cycle-travellers and settlements along the cycleway [20]. The re-functionalization of railway stations provides former railways with a renewed life. These buildings allow an increasing tourism value and a helpful infrastructure to promote the Italian natural, historical and landscape heritage.

The spatial, logical and systematic similarity between railway lines and cycleways allows for a quite direct approach to reuse. Stations express the ‘jump’ of scale from the territorial one of the cycleway towards the scale of buildings that physically embodies the joint between the cycleway and the settlements. For this reason, the re-functionalization of former railway stations requires procedures and actions adapted to each one, therefore available to face the multiplicity of landforms and dwellings arrangement placed along the cycleway across the Italian peninsula. At stake is an overall project aimed at providing former railways with a new territorial logic related to slow mobility.

3.1 The scenic/narrative device of the station-based circuit

One of the most important precedents for the re-functionalization of railway stations is the medieval theatre: a station-based circuit. In the middle ages, buildings dedicated to the theatre vanished. Plays moved to streets, squares, churches and other important venues connected through a circuit. The clear division between actors and audience faded. Spectators became involved in the plays like never before, becoming true protagonists [21]. No single model could articulate such theatre space: each play was adapted to the context with a particular arrangement according to the spatial features of the place [22]. Theatre and urban space merged, people no longer *went* to the theatre so much as *inhabited* it.

The circuit connected various ‘stations’, or centers of attraction, through the city, which had no other purpose but staging events and public representations. An iconic architectural example of this scenic/narrative relationship is provided by the Sacri Monti, defined as a “great mountain theatre” [23]. The Sacri Monti are complex territorial systems made up of a circuit connecting chapels with great artistic, symbolic and spiritual value, dedicated to the Christian faith [Fig. 6]. The circuit connects different chapels/stations along a hill: like a narration, it builds a sequence of events developing through the movement along the circuit. The sequence consists of sights focused on sacred scenes – and surrounded by the landscape – which turn the pilgrims into protagonists [24]. The audience is involved in the sense that it is able to reconstruct the symbolic narrative that joins all the chapels and the sceneries together.

Already in the past, the public space applied not only to places such as squares and markets, but also to roads for pilgrims and merchants: a large territorial infrastructure that kept people together within a huge collective space featuring a social, economic, symbolic, and religious identity [25]. According to

this precedent, nowadays cycleway can represent the occasion to conceive the path as a public space which identity is given by sites of historical heritage, landforms and settlements along the path. The scene in the station-based theater is fixed – or at least it has several fixed elements – but the representation changes. In the Sacri Monti, all chapels are fixed elements that repeat throughout the path. What changes is the scene and what is represented within the chapel. Similarly, railway stations repeat themselves along the railway line while other characteristics may vary. The typology of the station is pretty well identified by a repetitive architectural layout. But within this layout certain features can vary according to the specificities of the places in which the station stands or provides access to. Through the identification and transformation of this variable elements of the railway station the typology can be readdressed in the sense of a “threshold-spaces”. Namely: a building that in some way anticipates and tells the visitor about the territory he is going to cross with his bicycle. Moreover, this feature appears to be particularly relevant in order to trigger the development of ‘internal areas’ that are neglected in their majority. Former railway stations can play an important role in their revitalization, as well.

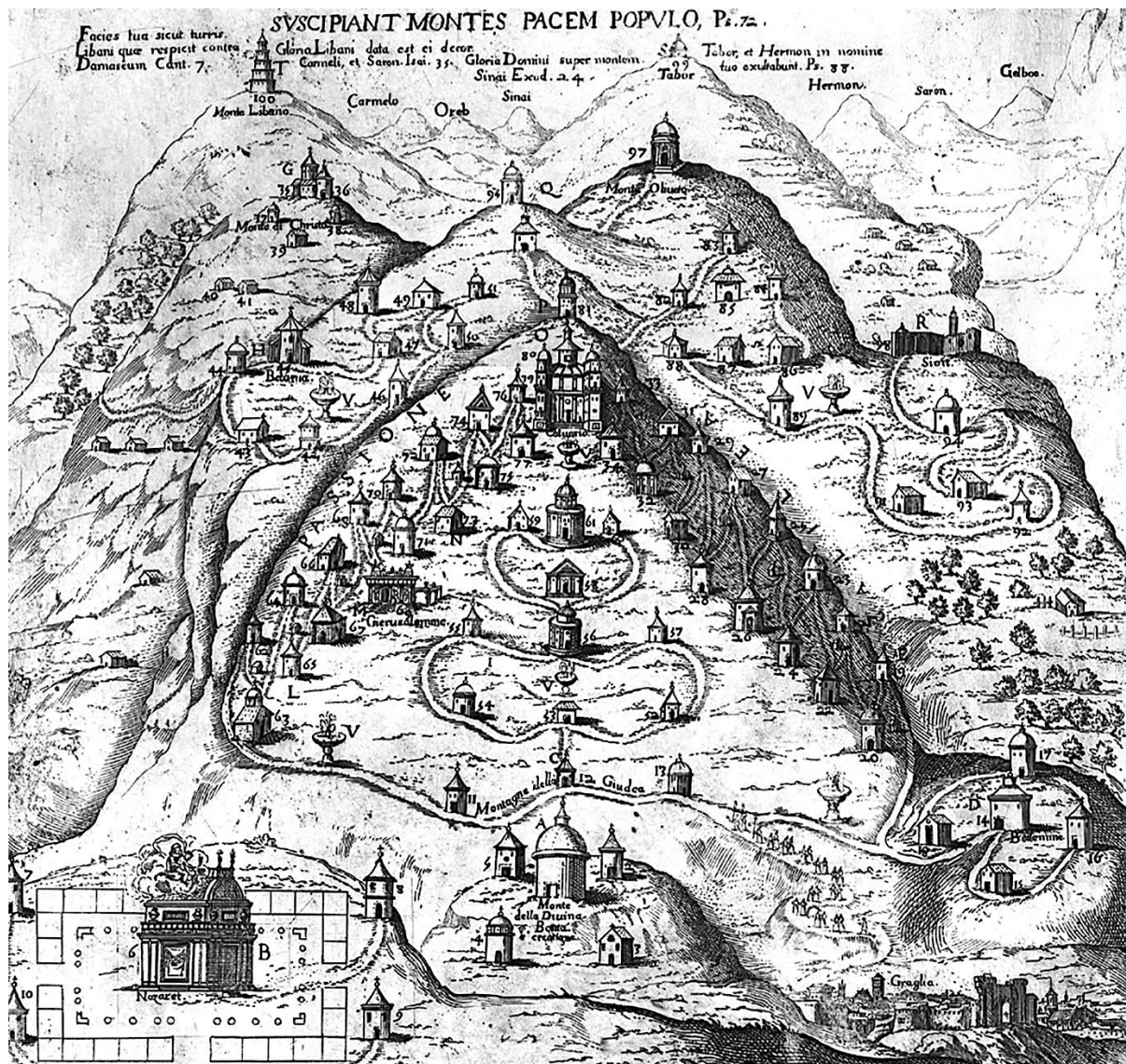


Fig. 6: Engraving of the Sacri Monti in Graglia entitled *La Novella Gerusalemme di Graglia* (mid XVII century).

3.2 The station as a 'threshold-space' and its relationship with settlements

Not always a station serves a single urban settlement. Sometimes several settlements share a common station. When this happens, the station might be relatively far from several of these settlements. Similarly, the station may also be remote for topographic reasons since settlements are at a height that cannot be directly reached by the railway. In short, for technical reasons, sometimes the connection between settlements and railways is economically unfeasible. Considering this scenario, the connection between stations and settlements becomes an occasion to design incorporating to different forms of slow mobility.

Being a space of transition, the station represents a threshold-space that bridges the gaps through an inflection point that merges various locations. It can work as a passage, an access, or another kind of connection that acts as an inhabitable space capable of allowing a mixture of realities of different nature, creating a gradient of intermediate conditions [26]. These spaces of connection, generated between people, are characterized by fluidity fading physical limits between interior and exterior. The threshold-space works as a driver of relationships and a significative space provided with a meaning as well as an identity negotiated between the settlement and the railway [27].

An example of railway station working as a threshold-space is provided by the entryway to the historical center of the Spanish city of Teruel [Fig. 7]. Here, a monumental stairway seeks to bridge – and also to create an important access – to the city, in order to enrich the entrance through the station via a ‘towering’ gesture of connection. When travelers arrive at the station, they met with a gateway unworthy of the city; before entering the city, they have to climb up a steep slope [28]. The solution to this landform problem is a stairway: The Paseo del Óvalo. The issue could have been resolved with a simple functional staircase; however, when José Torán de la Rad designed this stairway in 1920, he thought he could make a monument. So, an architectural solution to a specific problem became a landmark for both inhabitants and tourists reaching Teruel through the railway.

Moreover, not only the stairway but also an elevator designed by David Chipperfield Architects in 2001 – that is represented from the outside as a vertical fissure – accentuates the presence of the mountain and magnifies the landform of Teruel. In this way, through its architecture, the Teruel station is closely linked to the place where it is located, providing the project with a territorial meaning.

The Paseo del Óvalo is just one of the examples that can be mentioned about how an architecture project can become an important tool in the re-design of stations as threshold-spaces. It proves that a historical infrastructure offers the possibility to reconfigure the relationships between settlements and railways by the means of a public space conceived as a threshold-space [29].



Fig. 7: The monumental stairway of the Paseo del Óvalo built in 1920 in Teruel (Spain).

4. The historical railway as a linear monument and a reference for the project of new cycleways

In conclusion, it is important to highlight that the link between cycleways and former railways occurs in a multiplicity of ways.

A first way – actually, the most widespread one nowadays – is the cycleway that replaces the railway, keeping intact its nature of a monumental linear architecture. As we have seen (in section 1), this is the case of greenways that undertake a different use of track beds and abandoned train stations.

The second way concerns the railway tracks as devices that allows cyclists to experience the geographical features of landform. Here, the cycleway acts as a transitive device: it is by means of the ‘transit’ that railways express the geomorphologic form (or landform) of natural sites.

The third way sees the railway as a reference for the architectural and territorial design of new cycleways. The railway is a logical composition of elements at the territorial scale (in section 3 it is defined as a station-based architecture). The dismissed railway is not only acknowledged as an object to be preserved but also as an object to be studied in order to be used again for other purposes. In other words, the railway appears to be a resource – in terms of technic solutions – for contemporary cycleway designers who are confronted with the problem of linear territorial infrastructures. The versatility of the cycleway, namely the way it takes advantage of existing infrastructures (i.e. roads, canals, railways), represents an important occasion to contaminate project and heritage. The cycleway is not only an infrastructure for the flow of bicycle but also a ‘monument’ in the sense it reminds (monument from the Latin verb *monere*: to remember) the stratification of memories embodied in paths, stations and territories encountered throughout the journey.

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