POLITECNICO DI TORINO
Repository ISTITUZIONALE

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

Original
From historical railways to cycleways. Re-functioning the heritage of linear monuments / Dighero, Stefano; Dutto, Andrea Alberto; Franco Gonzalez, Erika. - ELETTRONICO. - (2020), pp. 552-561. (Intervento presentato al convegno XVIII International Forum Le Vie dei Mercanti tenutosi a Napoli (Italy) nel 24/09/2020 Napoli 25-26/09/2020 Capri).

Availability:
This version is available at: 11583/2838620 since: 2020-07-07T11:48:11Z

Publisher:
Gangemi Editore International Publisher

Published
DOI:

Terms of use:

This article is made available under terms and conditions as specified in the corresponding bibliographic description in the repository

Publisher copyright

(Article begins on next page)

25 April 2024

ARCHITECTURE HERITAGE and DESIGN

Carmine Gambardella

XVIII INTERNATIONAL FORUM

Le Vie dei Mercanti

World Heritage and Contamination

ARCHITECTURE | CULTURE | ENVIRONMENT | AGRICULTURE | HEALTH | ECONOMY
LANDSCAPE | DESIGN | TERRITORIAL GOVERNANCE | ARCHAEOLOGY | e-LEARNING

GANGEMI EDITORE SpA
INTERNATIONAL

ARCHITECTURE HERITAGE and DESIGN | 6
Collana fondata e diretta da Carmine Gambardella

ARCHITECTURE HERITAGE and DESIGN
Series founded and directed by Carmine Gambardella

Scientific Committee:

Carmine Gambardella
UNESCO Chair on Landscape, Cultural Heritage and Territorial Governance,
President and CEO of Benecon

Federico Casalegno
Professor, Massachusetts Institute of Technology, Boston

Massimo Giovannini
Professor, Università “Mediterranea”, Reggio Calabria

Bernard Haumont
Professor, Ecole Nationale Supérieure d’Architecture, Paris-Val de Seine

Danila Jacazzi
Professor, University of Campania “Luigi Vanvitelli”

Alaattin Kanoglu
Professor, Department of Architecture, İstanbul Technical University

David Listokin
Professor, Director of the Center for Urban Policy Research of Rutgers
University / Edward J. Bloustein School of Planning and Public Policy, US

Sabina Martusciello
President of the Degree Course in “Design and Communication”,
University of Studies of Campania “Luigi Vanvitelli”

Paola Sartorio
Executive Director, The U.S.A.-Italy Fulbright Commission

Elena Shlienkova
Professor, Samara State Technical University

Rosaria Parente
Ph.D. in “Architecture, Industrial Design and Cultural Heritage”
University of Studies of Campania “Luigi Vanvitelli”

Nicola Pisacane
Professor, Head of the Master School of Architecture – Interior Design
and for Autonomy Courses, University of Studies of Campania “Luigi Vanvitelli”

Riccardo Serraglio
Professor, University of Campania “Luigi Vanvitelli”’

Editorial Committee:

Lucina Abate
Alessandro Ciambrone
Gilda Emanuele
Rosaria Parente

Carmine Gambardella

WORLD HERITAGE and CONTAMINATION
Architecture, Culture, Environment, Agriculture, Health, Economy,
Landscape, Design, Territorial Governance, Archaeology, e-Learning
Le Vie dei Mercanti
XVIII International Forum

Editing: Alessandro Ciambrone

Il volume è stato inserito nella collana Architecture, Heritage and Design, fondata e diretta da Carmine Gambardella, in seguito a a peer review anonimo da parte di due membri del Comitato

The volume has been included in the series Architecture, Heritage and Design, founded and directed by Carmine Gambardella, after an anonymous peer-review by two members of the

©
Proprietà letteraria riservata
Gangemi Editore spa
Via Giulia 142, Roma
www.gangemieditore.it

Nessuna parte di questa pubblicazione può essere memorizzata, fotocopiata o comunque riprodotta senza le dovute autorizzazioni.

Le nostre edizioni sono disponibili in Italia e all'estero anche in versione ebook.
Our publications, both as books and ebooks, are available in Italy and abroad.

ISBN 978-88-492-3937-9

Cover: drawing by Le Corbusier 1931. Courtesy Carmine Gambardella

Carmine Gambardella

WORLD HERITAGE and CONTAMINATION

Architecture | Culture | Environment | Agriculture | Health | Economy
Landscape | Design | Territorial Governance | Archaeology | e-Learning

Le Vie dei Mercanti _ XVIII International Forum

GANGEMI EDITORE®
SPA
INTERNATIONAL

Topics:

Heritage

Tangible and intangible dimensions

History

Culture

Collective Identity

Memory

Documentation

Management

Communication for Cultural Heritage

Architecture

Surveying

Representation

Modeling

Data Integration

Technology Platforms

Analysis

Diagnosis and Monitoring Techniques

Conservation

Restoration

Protection

Safety

Resilience

Transformation Projects

Technologies

Materials

Cultural landscapes

Territorial Surveying

Landscape Projects

Environmental Monitoring

Government of the Territory

Sustainable Development

WORLD HERITAGE and CONTAMINATION

Le Vie dei Mercanti
XVIII International Forum

Naples | Capri
11 - 12 - 13 June 2020

President of the Forum

Carmine Gambardella
President and CEO Benecon,
UNESCO Chair on Cultural Heritage,
Landscape and Territorial Governance

Aygul Agir
Professor, Department of Architecture, Istanbul Technical University, Turkey

Ahmed Abu Al Haija
Professor and Head, Environmental Design, Urban and Architectural Heritage
Faculty of Engineering,Philadelphia University, Jordan

Ali Abu Ghanimeh
Vice president Al al-Bayt University Almafraq – Jordan

Pilar Garcia Almirall
Professor, UPC Ecole Tecnica Superior d'Arquitectura Barcelona, Spain

Harun Batirbaygil
Head, Department of Architecture, Okan University, Istanbul, Turkey

Artur Beu
Professor, University of Art, Tirana, Albania

Cevza Candan
Professor, İstanbul Technical University, Turkey

Orazio Carpenzano
Professor and Director of the Department of Architecture and Design, Sapienza University

Maurizio Carta
Professor, University of Palermo

Alessandro Ciambrone
Benecon University Consortium, UNESCO and Fulbright Former Fellow, Italy

Annamaria Colao
Professor, UNESCO Chair on Education to Health and Sustainable Development

Joaquín Díaz
Professor and Dean, Technische Hochschule Mittelhessen-University of Applied Sciences
Department of Architecture and Civil Engineering, Germany

Yurdanur Dulgeroglu
Professor and Head of the Department of Architecture, İstanbul Technical University, Turkey

Yonca Erkan
Chairholder UNESCO Chair, Kadir Has University, Turkey

Kutgun Eyupgiller
Professor, Department of Architecture, Istanbul Technical University, Turkey

Giuseppe Faella
Professor, University of Campania 'Luigi Vanvitelli'

Yankel Fijalkow
Professor, Ecole Nationale Supérieure d'Architecture Paris Val de Seine, France

Cherubino Gambardella
Professor, University of Campania 'Luigi Vanvitelli'

Stefania Gigli Quilici
Professor, Università della Campania 'Luigi Vanvitelli'

Xavier Greffe
Professor and Director, Centre d'Economie de la Sorbonne Paris, France

Manuel Roberto Guido
Italian Ministry of Heritage and Culture, Italy

Bernard Haumont
Professor, Ecole Nationale Supérieure d'Architecture Paris Val de Seine, France

Pedro António Janeiro
Professor, Faculdade de Arquitectura da Universidade de Lisboa

Tatiana Kirova
Professor, Polytechnic of Turin

Alaattin Kanoglu
Professor, İstanbul Technical University

Ilknur Kolay
Professor, Department of Architecture, Istanbul Technical University

Antonio Lampis
Director Museums, Italian Ministry for Cultural Activities

David Listokin
Professor, Edward J. Bloustein School of Planning and Public Policy, Rutgers University, USA

Andrea Maliqari
Professor and Rector of the Polytechnic University of Tirana, Albania

Sabina Martusciello
Design and Communication Degree Course (President)
University of Campania 'Luigi Vanvitelli', Italy

Massimo Menenti
Department of Geoscience and Remote Sensing, Faculty of Civil Engineering
Delft University of Technology, The Netherlands

Rusudan Mirzikashvili
Ministry of Cultural Heritage, Georgia

Doe Morelli
Professor, University of Campania 'Luigi Vanvitelli', Italy

Louise Mozingo
Chair, Landscape Architecture and Environmental Planning, University California Berkeley, USA

Maria Dolores Munoz
Professor, UNESCO Chair, EULA Environmental Centre, University of Conception, Chile

Florian Nepravishta
Dean of the Faculty of Architecture and Urbanism, Polytechnic University of Tirana, Albania

Luis Palmero Iglesias
Politècnica de València UPV, Spain

Jorge Peña Díaz
Professor, Facultad de Arquitectura, Instituto Superior Politécnico José Antonio Echeverría, Cuba

Rosaria Parente
Ph.D. in "Architecture, Industrial Design and Heritage" at the University of Camania

Rosario Pivonello
Professor, University of Naples 'Federico II'

Mosè Ricci
Professor, University of Trento

Daniele Riccio
Professor, University of Naples 'Federico II'

Paola Sartorio
Executive Director, The U.S.- Italy Fulbright Commission

Lucio Alberto Savoia
Ambassador, Secretary General Emeritus, Italian National Commission for UNESCO, Italy

Maria Anita Stefanelli
Department of foreign lenguagers, literature and Culture, Università degli studi RomaTRE, Italy

Elena Shlienkova
Professor of Architecture and Construction Institute of Samara State Technical University, Russia

Eusebio Leal Spengler
Professor, Historiador de la Ciudad de La Habana, Presidente de Honor del Comité Cubano del ICOMOS, Cuba

Ana Luiza Thompson-Flores
Director of the UNESCO Regional Bureau for Science and Culture in Europe, Venice (Italy)

Isabel Tort
Professor, Universitat Politècnica de València UPV, Spain

Marco Trifuoggi
Professor, University of Naples 'Federico II'

Andrey V. Vasilyev
Head of Department, Samara State Technical University of Russian Federation

Leandro Ventura
Director of the Central Institute For Ethno-anthropology, Italian Ministry for Cultural Activity

Yaliang Xiang
Professor, China Academy of Art, China

Yang XiuJing
Professor and Director, China Academy of Art, China

Organizing Committee

Alessandro Ciambrone

Committee

Rosaria Parente
Assistant of the International Committee President

Luciana Abate, Gilda Emanuele, Vincenzo Ferraro
Graphics and layout

Dario Martimucci
Web master

Peer review

Scholars has been invited to submit researches on theoretical and methodological aspects related to Smart Design, Planning and Technologies, and show real applications and experiences carried out on this themes. Based on blind peer review, abstracts has been accepted, conditionally accepted, or rejected. Authors of accepted and conditionally accepted papers has been invited to submit full papers. These has been again peer-reviewed and selected for the oral session and publication, or only for the publication in the conference proceedings.

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'.

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

CARMINE GAMBARDELLA

UNESCO Chairholder on Landscape, Cultural Heritage, and Territorial Governance; President and CEO of Benecon SCaRL 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

ARCHITECTURE | CULTURE | ENVIRONMENT | AGRICULTURE | HEALTH | ECONOMY
LANDSCAPE | DESIGN | TERRITORIAL GOVERNANCE | ARCHAEOLOGY | e-LEARNING

XVIII INTERNATIONAL FORUM

Le Vie dei Mercanti

Design by Le Corbusier 1931
Courtesy Carmine Gambardella

Le Vie dei Mercanti XVIII INTERNATIONAL FORUM
WORLD HERITAGE and CONTAMINATION
ARCHITECTURE|CULTURE|ENVIRONMENT|AGRICULTURE|HEALTH|ECONOMY
LANDSCAPE|DESIGN|TERRITORIAL GOVERNANCE|ARCHEOLOGY|e-LEARNING
Naples 11 - Capri 12|13 June 2020

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

Stefano DIGHERO,[1] Andrea Alberto DUTTO,[2] Erika FRANCO GONZALEZ [3] (*)
(1) Department of Architecture and Design, Politecnico di Torino, Italy
stefano.dighero@polito.it
(2) andrea_dutto@polito.it
(3) erika.franco@polito.it
(*) Andrea Alberto Dutto is author of sections 1, 1.1, 1.2, 1.3, 2.2, 2.3, 4. Stefano Dighero is author of sections 2, 2.1. Erika Franco Gonzalez is author of sections 3, 3.1, 3.2.

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.

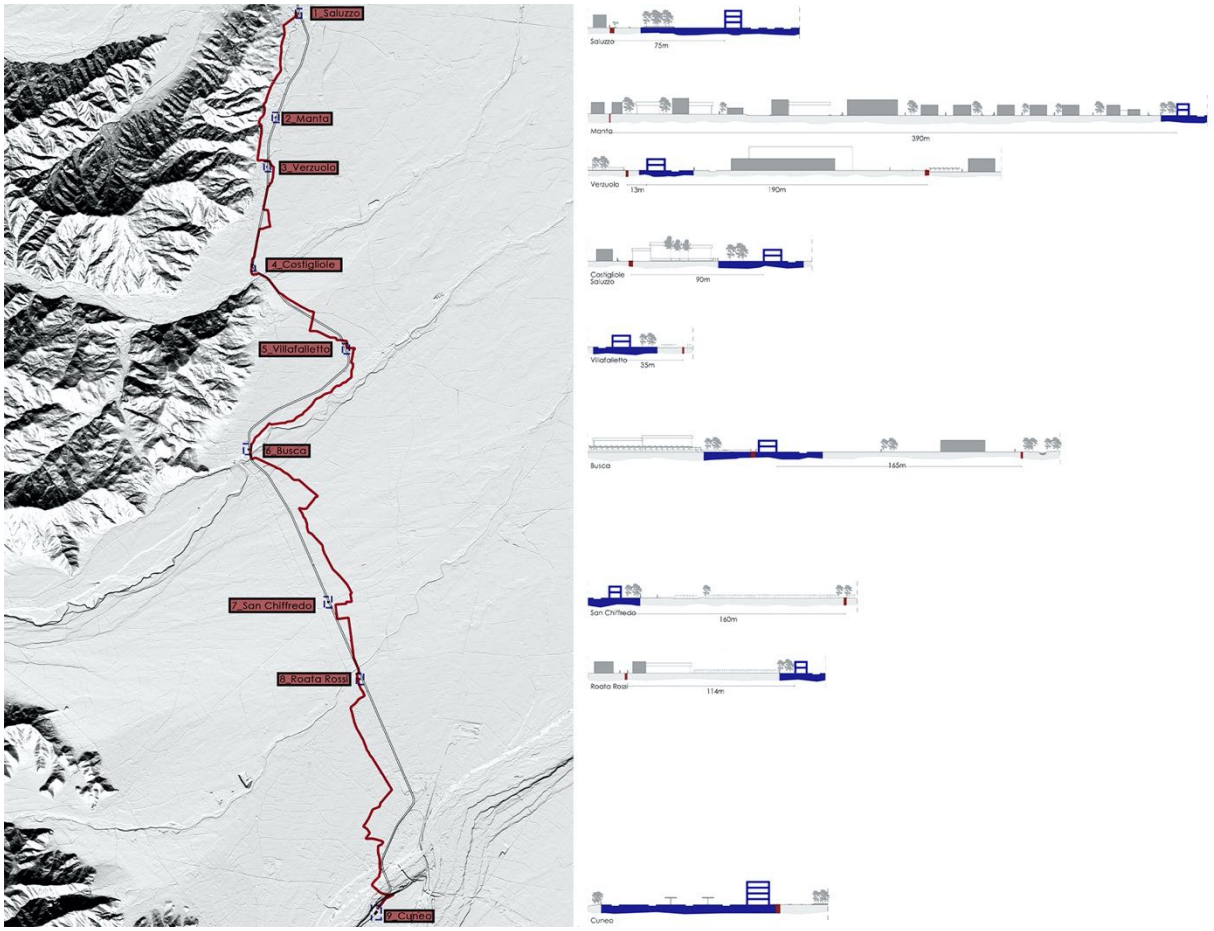

Fig. 1: Map of the landform with the project of the cycleway (in red). On the right: cross sections highlighting the relationship between cycleway (red) and train stations (blue). Graduation thesis in Architecture of Stefania Ghietto, *Stazioni impresenziate e binari ferroviari dismessi: un problema 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 o 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.

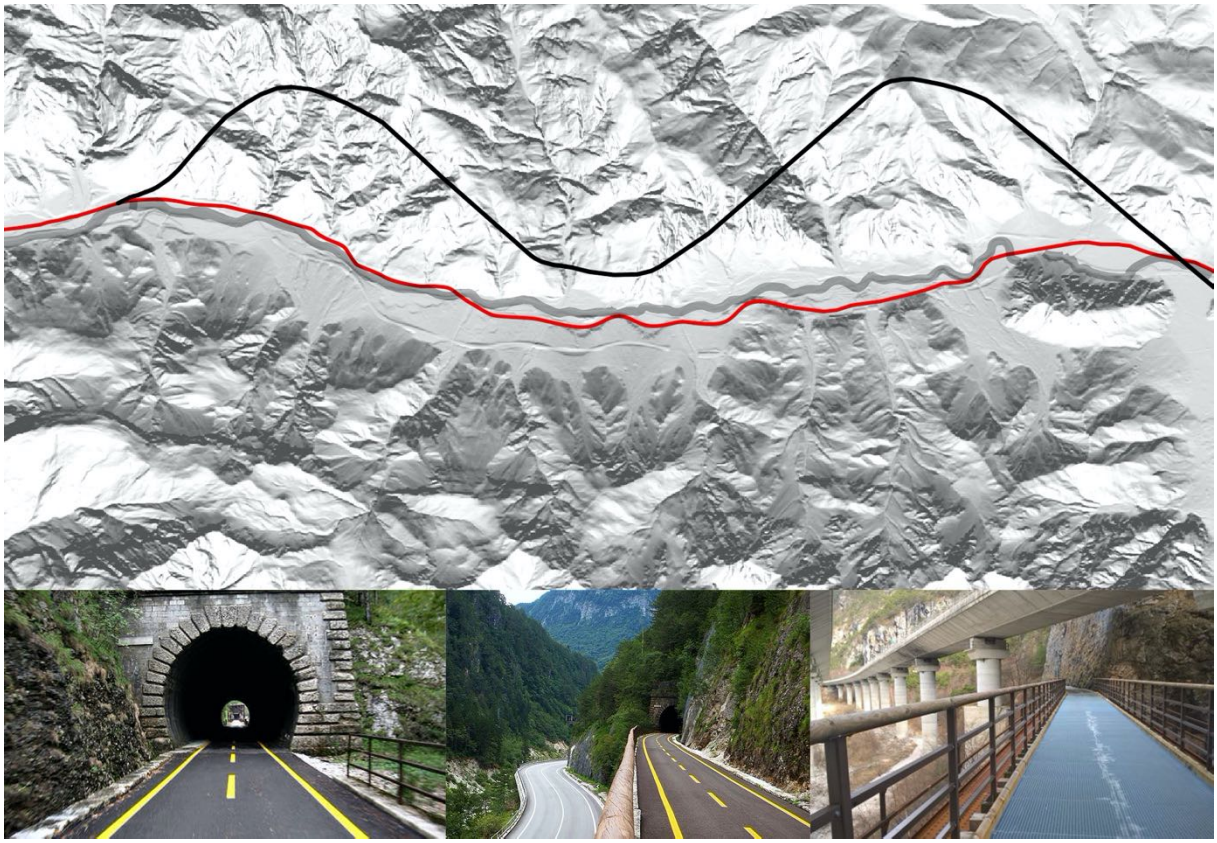

Fig. 2: Map of the Alpe-Adria cycleway (red) on the former narrow-gauge railway Udine-Tarvisio, with indication of the new railway (black); the cycleway follows the embankment of the river Fella and dialogue with road infrastructure.

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.

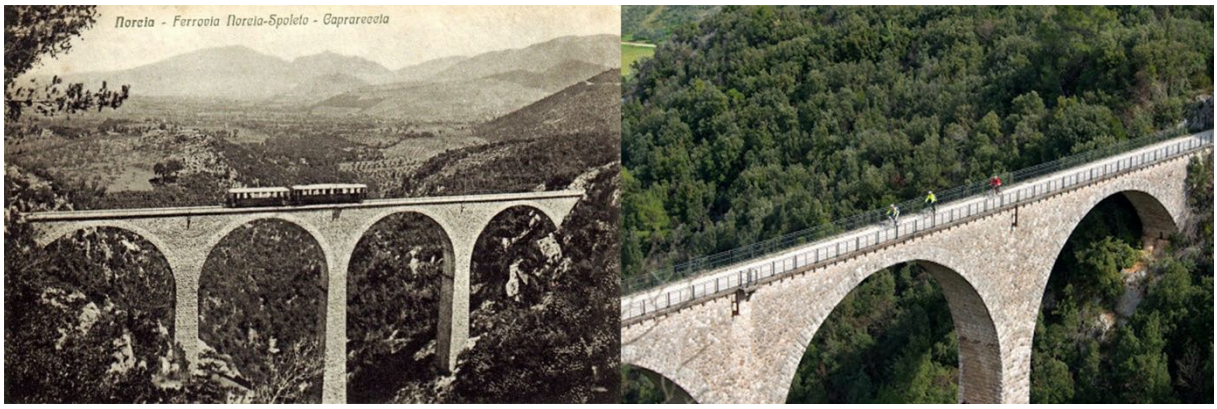

Fig. 5: The Caprareccia bridge of the former narrow-gauge railway Spoleto-Norcia, around the 1950s and nowadays.

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 Òvalo. 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 Òvalo 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 Òvalo 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.

Bibliographical References

[1] The research is carried out under a collaboration agreement pursuant to art. 15 of the Law 241/1990, and subsequent amendments, between Ministry of Infrastructure and Transport, University of Cagliari and Politecnico di Torino. The Politecnico di Torino research group is composed by R. Palma (scientific coordinator), S. Dighero, A. A. Dutto, E. Franco.
[2] SENES, Giulio. Greenways: un modo per valorizzare il patrimonio ferroviario dismesso. Una panoramica internazionale. In MAGGIOROTTI, Iliana. *Atlante di viaggio lungo le ferrovie dismesse*. 2ª ed. Roma: Ferrovie dello Stato italiane, 2018, p. 7.
[3] MAGGIOROTTI, Iliana. *Atlante di viaggio lungo le ferrovie dismesse*. 2ª ed. Roma: Ferrovie dello Stato italiane, 2018.
[4] *Ibid*., pp. 92-95.
[5] LACCHÈ, Camillo. *L'Ottocento ferroviario italiano*. Viterbo: Stabilimento tipolitografico Agnesotti, 1977, pp. 112-116.
[6] GHIETTO, Stefania. *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*. Master Thesis in Architecture, Politecnico di Torino, Corso di laurea magistrale in Architettura per il progetto sostenibile. Supervisors: Riccardo Palma, Chiara Occelli, 2019.
[7] Parlamento italiano. Law 2/2018. *Disposizioni per lo sviluppo della mobilità in bicicletta e la realizzazione della rete nazionale di percorribilità ciclistica*, 2018.
[8] *Ibid*.
[9] Parlamento italiano. Law 128/2017. *Disposizioni per l'istituzione di ferrovie turistiche mediante il reimpiego di linee in disuso o in corso di dismissione situate in aree di particolare pregio naturalistico o archeologico*, 2017.
[10] Webpage: https://whc.unesco.org/en/list/1276/ [consulted on 25/03/2020].
[11] ORMEA, Giovanni Battista. *Manuale pratico per l'ingegnere civile*. Roma: Kappa, 1988, p.1571.
[12] *Ibid*., p. 1667; see also OCCELLI, Chiara, PALMA, Riccardo, SASSONE, Mario. L*a ciclostrada del Canale Cavour: una via a bassa velocità tra Torino e Milano*. Boves: Araba Fenice, 2012.
[13] MARCARINI, Albano; ROVELLI, Roberto*. Atlante italiano delle ferrovie in disuso*. Firenze: Istituto geografico militare, 2018, pp. 100-103.
[14] DUTTO, Andrea Alberto, PALMA. *Ponti abitati e ciclovie. Piccolo manuale per la progettazione di velostazioni*. Boves (CN): ArabaFenice, 2019, p. 6.
[15] BOTTINI, Massimo. *La ferrovia sognata Santarcangelo/Fabriano*. Santarcangelo di Romagna: Unione dei Comuni Valle del Marecchia, 2010.
[16] MARCARINI, Albano; ROVELLI, Roberto*. Atlante italiano delle ferrovie in disuso*. Firenze: Istituto geografico militare, 2018, pp. 172-173.
[17] *Ibid*., 108-109.
[18] CIOCI, Adriano. *La ferrovia Spoleto-Norcia*. Bastia Umbra: Kronion Libri, 1988.
[19] MARCARINI, Albano; ROVELLI, Roberto*. Atlante italiano delle ferrovie in disuso*. Firenze: Istituto geografico militare, 2018, pp. 77-78.
[20] AA.VV. *Rapporto di sostenibilità. Il viaggio continua*, 2018.
[21] SINISI, Silvana, INNAMORATI, Isabella. *Storia del teatro. Lo spazio scenico dai greci alle avanguardie*. Milano: Bruno Mondadori, 2003.
[22] MASSIP, Francesca. *El teatro medieval: voz de la divinidad cuerpo de histrión*. Barcelona: Montesinos S.A, 1992.
[23] TESTORI, Giovanni. *Il gran teatro montano*. Milano: Feltrinelli, 2015.
[24] SCACCABAROZZI, Annalisa. Gerusalemme sulle Alpi. Progetti per il Sacro Monte di Varallo. *Sacri Monti. Rivista di arte, conservazione, passaggio e spiritualità dei Sacri Monti piemontesi e lombardi*. No. 2, 2010, pp. 114-133.
[25] OCCELLI, Chiara, PALMA, Riccardo. Lo stupore della lentezza. Ciclovie, infrastrutture e nuovi immaginari territoriali. *Agribusiness Paesaggio & Ambiente*. Vol. XIV, no.3, 2011, pp. 228-236.
[26] CAPRA, Fabio. Las contrastantes evocaciones del límite. In: *Trienal de Investigación 2014*. Caracas: Facultad de Arquitectura y Urbanismo, 2014.
[27] BASSANELLI, Michela. Interno | Esterno: Lo spazio soglia come nuovo luogo della domesticitá. *BDC. Bollettino del Centro Calza Bini*. Vol. 15, no. 2, 2015, pp. 315-326.
[28] ALDECOA CALVO, José Serafín. El difícil impulso del nuevo siglo. In: *Comarca de la Comunidad de Teruel*. Zaragoza: Diputación General de Aragón, 2010, pp. 145-152; see also the webpage: http://www.patrimonioculturaldearagon.es/bienes-culturales/la-escalinata-teruel (consulted on 25/03/2020)
[29] OCCELLI, Chiara, PALMA, Riccardo. Emblematica dell'architettura della Terra. Introduzione a uno studio sul Canale Cavour. In BESENVAL, Noela. *Il Canale Cavour come corridoio della collettività*. Torino: Accademia University Press, 2016, pp. 7-14.

Table of content

15 ID 002. *Structures and infrastructures of the central Adriatic. Topics for new environmental policies*
Ottavia ARISTONE, Lucia SERAFINI

25 ID 005. *Çilehane as A Place for Thinking*
Melih KURNALI, Duygu KOCA

34 ID 006. *Processes behind regional planning in Lebanon's Hinterland: The Cases of the Unions of Municipalities of Jezzine and Tyr*
Balsam MADI

42 ID 007. *The "Terzo Paradiso": the meeting point between Man, Art, Agriculture*
Francesca MUZZILLO, Fosca TORTORELLI

47 ID 008. *The role of art for the regeneration of the public city. The experiences of the Metropolitan Cities of Palermo and Naples*
Chiara AMATO, Giulia BEVILACQUA

57 ID 009. *Abandoned for good? Peenemünde as an example for dealing with a cultural landscape facing multifaceted contamination issues*
Peter I. SCHNEIDER, Constanze RÖHL

65 ID 013. *Preliminary approach to conservative actions on artefacts of historical and monumental value. Application to 4 old bridges crossing the Savuto river in Calabria*
Caterina GATTUSO, Domenico GATTUSO

75 ID 014. *Urban regeneration policies to enhance touristic mobility and economy*
Domenico GATTUSO, GianCarla CASSONE, Margherita MALARA

85 ID 015. *Advanced knowledge techniques and proposals for a compatible reuse and enhancement of a disjointed urban area: Villa Bossi in Busto Arsizio and its surroundings*
Daniela ORENI, Gianfranco PERTOT

95 ID 016. *Structure/external envelope relationship in the Monte dei Paschi di Siena headquarters in Colle Val d'Elsa (SI) by Giovanni Michelucci*
Frida BAZZOCCHI, Cecilia CIACCI, Vincenzo DI NASO

104 ID 018. *Landscape aesthetic contamination, from weak point to urban redemption element: case Eleusis, Greece*
Costantino PATESTOS, Neratzia TZORTZI

115 ID 019. *Management Plans for cultural heritage sites, as tools for inclusive approach in the developing countries: Case study of Prizren Historic Center Management Plan*
Nora ARAPI KRASNIQI

123 ID 020. *The eighteenth-century lucanian landscape from 'drawings of travellers' and notebooks of land surveyors*
Enza TOLLA, Giuseppe DAMONE

132 ID 021. *Elena Mendia and women's professionalism in Neapolitan post-war architecture*
Chiara INGROSSO

142 ID 022. *Intermodal digital experiences for the documentation and storage of historical-critical data aimed at the enhancement and use of the historical-urban landscape*
Asia BARNOCCHI, Luca MENEGATTI

150 ID 023. *The Role of Evaluation and Participation in developing Cultural Heritage Enhancement Projects. A Participatory Multicriteria Analysis applied to the "Certosa di Pisa" in Calci (Tuscany, IT) case study*
Agnese AMATO, Massimo ROVAI, Maria ANDREOLI

160 ID 025. *Numerical evaluation of environmental performance of a renaissance building to address a comprehensive strategy: the case of Palazzo Tassoni Estense in Ferrara (Italy)*
Marta CALZOLARI, Barbara GHERRI, Victor MARANHAO, Davide POLETTI

170 ID 026. *Alternative museum in Rome. Industrial architecture heritage colonized by XXI century's art*
Miriam CONFETTO

180 ID 027. *The Experience of Parametric modeling design GIS: An Abruzzo hamlet case study*
Domenico D'UVA, Federico EUGENI

185 ID 028. *The representation for the knowledge and development of the city and its territory*
Massimo MALAGUGINI

195 ID 029. *Seismic aspects on architectural design*
Marsida TUXHARI, Markel BABALLËKU

204 ID 030. *Water as architecture*
Enrica PIERAGOSTINI, Salvatore SANTUCCIO

214 ID 031. *Notes on the material communication of design intentions: a case study in Molise of particular collective value*
Piero BARLOZZINI

223 ID 032. *Enhancing the Defensive System of the City of Sagunto*
Giulia PETTOELLO

231 ID 033. *Conserving the Chromatic Value of Plaza Doctor Collado in Valencia*
Giulia PETTOELLO

239 ID 034. *A perfect example of a Vitruvian atrium: the main atrium of the Casa del Centenario in Pompeii*
Alberto CUSTODI

249 ID 035. *The UN2030 Sustainable Development Goals and the Parrhasian Heritage Park*
Giuseppe BIAGINI

257 ID 040. *A Study on Distribution Planning for Citizens' Hydrants with the User Experimental Drill of Extra Connectable Hoses in Kiyomizu WCH Zone, Kyoto JAPAN*
Takeyuki OKUBO, Dowon KIM, Tomohiko OWADA, Michiko HAYASHI

267 ID 041. *The overseas contamination of Enlightenment legal thought. The correspondence between Gaetano Filangieri and Benjamin Franklin (1781-1787)*
Maria NATALE

276 ID 042. *Drawings and Utopias: A Never Built House by the Sea; A Project by Noronha da Costa to Magoito, Sintra, Portugal, 1971-∞*
Pedro António JANEIRO, José FERREIRA CRESPO

286 ID 043. *The Drawing and the Painting as a Possible or an "Impossible"(?) Architectural Project(s) or Hypothetical House(s) in Luís Noronha da Costa*
José FERREIRA CRESPO, Pedro António JANEIRO

295 ID 044. *The risks and dangers of planning and building on the universal values of the UNESCO heritage of the Natural and Cultural-Historical area of Kotor*
Goran RADOVIĆ, David RADOVIC

305 ID 045. *Small construction sites for the regeneration of public space*
Fernanda CANTONE, Francesca CASTAGNETO

315 ID 046. *Fès and its Medina: a key-case study of architectural contamination*
Elena DE SANTIS, Tiziano INNOCENZI

325 ID 048. *Revitalization the integrated values of the Darius I the Great inscription, as the cultural property belonging to humanity. Bisitun, Iran*
Sara POURYOUSEFZADEH

336 ID 050. *A network of slow routes between Italian UNESCO sites. A territorial strategy to enhance the in-between territories and the inner areas*
Andrea ROLANDO, Alessandro SCANDIFFIO

345 ID 051. *Interventions on Cultural Heritage: Architecture and Neuroscience for Mindful Projects*
Valeria MINUCCIANI, Nilufer SAGLAR ONAY

353 ID 052. *From Dawn to Dusk. Space and Contamination in Markets.*
Salvatore SANTUCCIO, Marta MAGAGNINI

363 ID 054. *From Italy to Montenegro: cultural contaminations and disciplines exchanges for the enhancement of the Roman town of Doclea*
Lucia ALBERTI, Bruna DI PALMA

373 ID 055. *A new Renaissance for the ancient villages: between valorisation and guidelines*
Gigliola AUSIELLO, Manuela COMPAGNONE, Francesco SOMMESE

383 ID 057. *Discovering, conserving and communicating the past. Synergies and antagonies between archaeology, restoration and museography in order to make accessible the past legacy*
Michela BENENTE, Valeria MINUCCIANI, Melania SEMERARO

391 ID 059. *Without Borders. I don't see any enemies in my neighborhood*

399 ID 060. *Drawing as a Legacy: the drawn landscapes of the city and its reading in the thickness of the present*
Pedro António JANEIRO

408 ID 061. *For an intercultural approach to knowledge of cultural heritage*
Rossana GABAGLIO

414 ID 063. *Industrial heritage regeneration in Beijing: a sustainable case study*
Marichela SEPE

424 ID 066. *Art and public space. Between history and nature*
Laura RICCI, Francesco CRUPI

434 ID 067. *Famous architectures in urban contexts: the impact of colours and materials*
Gigliola D'ANGELO, Marina FUMO, Claudia LOMBARDI, Pia LOPEZ IZQUIERDO BOTÍN

444 ID 068. *Survey, Modeling, and Documentation for Preservation: Digitization Challenges towards Cultural Heritage Enhancement and Conservation*
Federica MAIETTI, Federico FERRARI, Marco MEDICI, Marinos IOANNIDES

453 ID 070. *Italy and China, between History and Nature. A network of networks for urban regeneration and territorial rebalancing*
Laura RICCI, Yezheng TANG, Chiara RAVAGNAN

463 ID 071. *Early medieval Benedictine settlements and monastic landscape in Italy. A shared path and a case study*
Ruggero LONGO, Enrico MONCALVO

475 ID 072. *Digital Technologies for preservation and promotion of Cultural Heritage: Tivoli and the Sanctuary of Hercules Victor.*
Giorgia CECCONI, Giulia LOPES FERREIRA

484 ID 078. *Strada Nuova: as an example of a resilient cultural landscape*
Patrizia BURLANDO, Sara GRILLO

494 ID 079. *Contaminated Architecture*
Luca ZECCHIN

504 ID 082. *Aversa towards a new instrument of territorial governance: a proposal*
Claudia DE BIASE, Irene D'AGOSTINO

515 ID 083. *Capri and modern architecture in Plinio Marconi's drawings*
Simona TALENTI

523 ID 085. *Surveying the material and immaterial qualities of a shared urban landscape. Flows of users in transit in a contemporary Adriatic city*
Antonella SALUCCI, Giovanni MATALONI, Francesca LIBERATORE

532 ID 087. *Rethinking the building envelope. Rehabilitation project and maintenance strategies for the RAI Auditorium in Naples*
Pasquale MIANO, Maria Rita PINTO, Stefania DE MEDICI

542 ID 088. *Ancient Noto. Reading the "absence" as a strategy in the conservation and enhancement of the archaeological ruins*
TONELLO, Emanuela SORBO

552 ID 091. *From historical railways to cycleways. Re-functioning the heritage of linear monuments*
Andrea Alberto DUTTO, Stefano DIGHERO, Erika FRANCO GONZALEZ

562 ID 092. *From the project drawing to the survey model: the Enrico Fermi school in Celano 1932-1934*
Alessandra TATA

570 ID 093. *The power of collective imagination: A methodological opportunity for reading the presence of architecture's hidden explanatory potential*
Francesca SIBILIO

575 ID 094. *Agriculture*
Maria Gabriella ERRICO, Anna ATTADEMO

585 ID 095. *Cultural and Agri-Cultural Heritage "contamination" at the Milan south periphery*
Nerantzia TZORTZI, Laura GUAITA, Aspassia KOUZOUPI

596 ID 096. *Coast-amination. Regeneration paths between water and land along the Lazio southern coast*
Francesca ROSSI, Antonella CANTARO

606 ID 097. *Towards Eco-Planning principles. Torre-Cancello decommissioned railway in Campania Region a regeneration masterplan proposal*
Salvatore LOSCO, Claudia de BIASE

616 ID 099. *Surveying and Actioning the Tangible and Intangible dimensions of Rural Heritage in RURITAGE H2020 Project*
Rosa TAMBORRINO

624 ID 100. *3D data modeling toward social innovation. The documentation of the minor cultural heritage damaged by the earthquake*
Fabiana RACO

632 ID 101. *KHAN EL ECHLE, SAIDA: a case study for the building stratigraphic analysis supporting the structural strengthening and conservation design*
Laura NICOLINI

642 ID 102. *Built heritage contamination: the case of João Pessoa, Paraíba, Brazil*
Ivan CAVALCANTI FILHO, Jessica SOARES DE ARAÚJO RABELLO, Emanoel Víctor PATRÍCIO DE LUCENA

652 ID 104. *Liberty winter gardens in Palermo: contamination from solar design*
Simona COLAJANNI, Calogero VINCI, Marco BELOMO

660 ID 106. *Acireale Living Lab Culture and Technology. Small towns, internal areas and new landscapes: strategies to protect heritage*
Mariagrazia LEONARDI

669 ID 107. *Under modernity sky. Pierre Bossan's industriousness in 19th century European sacred architecture*
Maria Carolina CAMPONE

679 ID 109. *Locus Umbria. The project as a recomposition of the tradition/innovation antinomy*
Paolo BELARDI

689 ID 111. *History and project. Reuse of historical tracks*
Annarita ZARRILLO

699 ID 112. *The creation of values through Art and Design thinking*
Mariacarla PANARIELLO

705 ID 115. *Waterfront regeneration in front of heritage protection: challenges and opportunities in Catania waterfront*
Daniele RONSIVALLE

713 ID 116. *Contamination Through a Second Skin on Contemporaneity Architectonics*
Alexandra AI QUINTAS, Mário SALEIRO FILHO

723 ID 117. *Fortress town of Palmanova. Actions on the driver of cultural values: designing contemporary borders enhancing overall landscape quality and identity*
Claudia BATTAINO

732 ID 119. *The analyses of the settlement strategies of the minor historic centres. The case study of Piedicastello in Trento*
Valerio DA CANAL

740 ID 120. *an*
Maria Dolores MORELLI

750 ID 121. *Urban Revitalization: "Domus in via degli Orti" Area, in Santa Maria Capua Vetere*
Francesco Pio ARCELLA

760 ID 124. *Intangible heritage between landscape protection and territory development. A plan for the Island of Pantelleria*
Giorgia DE PASQUALE, Serena SAVELLI

766 ID 126. *Historical Vessels as Cultural Heritage. An Italian heritage nowadays underrated by law and community*
Maria Carola MOROZZO DELLA ROCCA, Giulia ZAPPIA

776 ID 128. *Abstract Architectural Design for the Contamination by Cultural Ideas*
Dominik LENGYEL, Catherine TOULOUSE

786 ID 129. *Risks and Landscapes: exploring relationships and opportunities in the Campania Region*
Adriana GALDERISI, Giuseppe GUIDA

794 ID 130. *Villa La Gallietta on Lake Como: an example of best practice in the design, restoration, management and development of cultural heritage*
Roberto DE PAOLIS

803 ID 134. *Reinterpreting urban open spaces as hub with high technological performance*
Rossella FRANCHINO, Caterina FRETTOLOSO, Francesca MUZZILLO

811 ID 135. *A new baroque for the environmental quality of the city*
Roberta COCCI GRIFONI, Maria Federica OTTONE, Graziano Enzo MARCHESANI

817 ID 136. *Contamination between architecture and contemporary art: good practices of temporary use of spaces in the historic city*
Daniele DABBENE

825 ID 137. *"Sapienza" University District, between management and enhancement*
Williams TROIANO, Giuseppe PAGANELLI, Giovanna CRESCIANI

836 ID140. *Restoration and Ruins. Achievements and Theoretical Issues*
Clara VERAZZO, Mariangela BITONTI

846 ID 141. *The incorporation of vernacular traditions in 20th century erudite architecture and music: a choice of freedom*
Clara Germana GONÇALVES

856 ID 143. *built heritage*
Antonio BIXIO, Giuseppe D'ANGIULLI

864 ID 145. *Renewed Sicilian Urban Landscapes. Transformation, Regeneration and Reuse of degraded areas*
Teresa CILONA

874 ID 146. *Learning from Berlin: The Case for Heritage Contamination as Mnemonic Device in Post-Yugoslav Space*
Erika LINDSAY

882 ID 149.
Massimiliano AGOVINO, Maria Carmela GAROFALO, Sabina MARTUSCIELLO, Enrica PAGANO

890 ID 150. *The impact of creative workers on economic prosperity. A regional level analisis in Italy*
Massimiliano CERCIELLO, Antonio GAROFALO, Maria Carmela GAROFALO

898 ID 151. *Echoes of the European "paths": the paths of San Corrado a Noto between history and enhancement of the landscape*
Lucia TRIGILIA, Alessia CICERO

907 ID 152. *Low Frequency Noise Estimation and Reduction in Conditions of Urban Territories (Russian Experience)*
Andrey V. VASILYEV

913 ID 153. *Estimation, Forecasting and Reduction of Vibration Caused by Transport and Industry*
Andrey V. VASILYEV

921 ID 154. *From private to public to cult site. The changing architecture of Pagani's Toselli*
Maria MARTONE, Alessandra Marina GIUGLIANO

931 ID 155. *New tools of strategic management for revitalizing small historical centers: the "Historical Small Smart City" Protocol*
Valentina PICA

944 ID 159. *Landscape and memory of places. The new insert of sacred buildings*
Saverio CARILLO

954 ID 161. *The restoration of the facades of the Royal Palace of Caserta: a new contribution in the knowledge of the materials of the architectural surfaces*
Amalia GIOIA

962 ID 164. *Advanced representation for preservation and communication of cultural heritage*
Giulia PELLEGRI, Francesca SALVETTI

971 ID165. *The Vases Collections of the Museo Campano. Acquisitions and Installations*
Gianluca DE ROSA

977 ID 166. *Smart materials and Phase Change Material (PCM): potential applications to architectural design*
Federico ORSINI, Paola MARRONE

985 ID 167. *The invention of Castel Sant'Elmo in Naples*
Cesare CUNDARI, Gian Carlo CUNDARI, Maria Rosaria CUNDARI

991 ID 168. *The "measurements" of the Complex of San Carlo alle Quattro Fontane*
Giuseppe ANTUONO

1000 ID 169. *4D-HBIM for the conservation and valorization of cultural heritage*
Cesare VERDOSCIA, Antonella MUSICCO, Giovanni MONGIELLO, Riccardo TAVOLARE, Alessia SALOMONE

1009 ID 170. *Cultural Capital vs. Technological Capital: A Critique of Online Learning Commodity Fetishism*
Rachel Suet Kay CHAN

1017 ID 171. *Sana-school project*
Giuseppe D'ANGELO, Rosaria SAVASTANO

1025 ID 172. *Digital cultural heritage: some notes from conservative experience*
Laura BARATIN, Francesca GASPARETTO

1035 ID 173. *The industrial area of Crotone: from problem to opportunity for development*
Domenico PASSARELLI, Pasquale CITRIGNO, Ferdinando VERARDI

1047 ID 174. *Fascist summer camps. Space, hygiene and distance*
Antonella MARCIANO

1055 ID 175. *Experimental preservation: art, air-pollution, preservation and Jorge Otero-Pailos*
Marina D'APRILE

1065 ID 176. *The conservation of the living religious heritage site of Bagan*
Davide MEZZINO, Tatiana K. KIROVA

1075 ID 177. *Urban archaeology and digital applications: the Amba Aradam station of the underground line C in Rome*
Emanuel DEMETRESCU, Simona MORRETTA, Rossella REA

1085 ID 180. *Design and Bim for the management of hospitals and nursing homes: proposals at the time of Covid-19*
Rosaria PARENTE

1097 ID 187. *Design of contemporary architectures and urban spaces in Paris*
Alessandro CIAMBRONE

GANGEMI EDITORE®
SrA
INTERNATIONAL

GIUGNO 2020

www.gangemieditore.it

benecon knowledge network

United Nations Educational, Scientific and Cultural Organization

UNESCO Chair on Landscape, Cultural Heritage and Territorial Governance
BENECON Research Centre of Competence of the Campania Region for Cultural Heritage, Ecology and Economy, Naples, Italy

Università degli Studi della Campania *Luigi Vanvitelli*

PEGASO Università Telematica

Università degli Studi del Sannio

supported by

United Nations Educational, Scientific and Cultural Organization

With the support of
Regional Bureau for Science and Culture in Europe

MiBACT Ministero per i beni e le attività culturali e per il turismo

UNIVERSITÀ DEGLI STUDI DELLA CAMPANIA
LUIGI VANVITELLI
SCUOLA POLITECNICA E DELLE SCIENZE DI BASE
DIPARTIMENTO DI ARCHITETTURA E DISEGNO INDUSTRIALE

PEGASO
Università Telematica

Organizzazione delle Nazioni Unite per l'Educazione, la Scienza e la Cultura

Commissione Nazionale Italiana per l'UNESCO

FULBRIGHT
THE US - ITALY FULBRIGHT COMMISSION
Linking Minds Accross Cultures

forum UNESCO
UNIVERSITY AND HERITAGE

UNIVERSITAT POLITÈCNICA DE VALÈNCIA

Organizzazione delle Nazioni Unite per l'Educazione, la Scienza e la Cultura

Cattedra UNESCO "Educazione alla salute e allo sviluppo sostenibile", Università degli Studi di Napoli Federico II, Napoli (Italia)

GANGEMI EDITORE® SpA
INTERNATIONAL