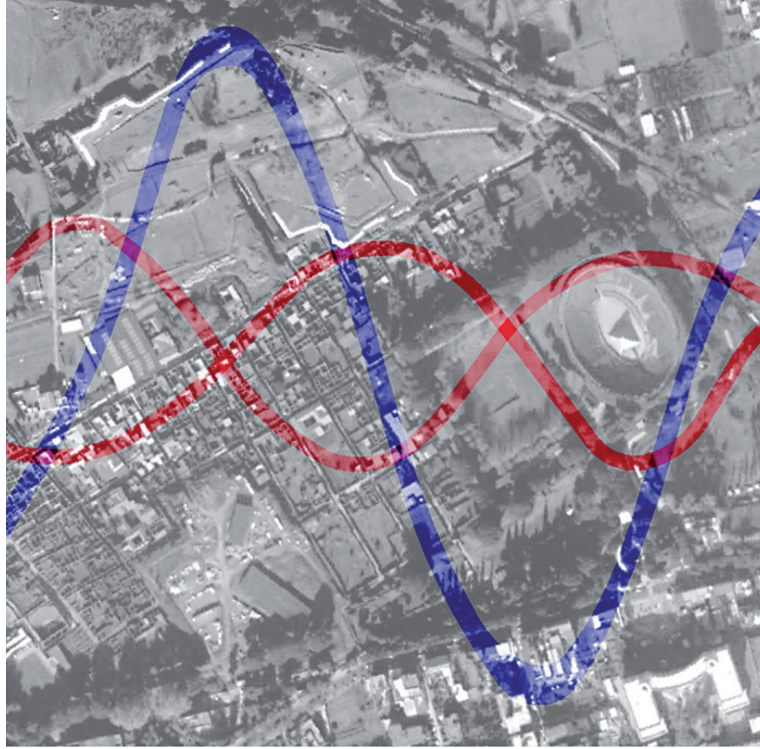


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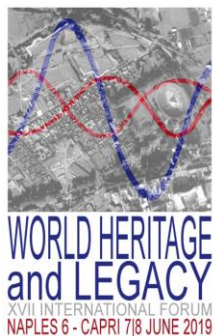
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Between legacy and abandonment. The reuse of minor railways as resilience paths

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Abstract

In the framework of issues related to the regeneration of fragile territories, affected by abandonment processes that involve areas of landscape interest, the proposed reflection focuses on the experiences of reuse of common goods: in particular underutilized or disused minor railways. These practices represent emblematic paths of innovative planning and management of territorial heritage and define resilient integrated strategies able to recover and strengthen material and immaterial relationships belonging to the environmental and socio-economic structure of contemporary territories and to the landscape as a unitary and shared image and legacy of the local culture.

Therefore, the reflection pursues the aim of identifying new methodological and operational references for the integrated reuse of railway lines in a perspective of landscape valorization and sustainable tourism development through the establishment of new greenways and historical train services. An integration that seizes the opportunity to enhance historical memory and environmental quality, as well as the demand of socio-economic revitalization and the fostering of cultural contamination through new forms of slow mobility and new creative uses, even rooted in local culture and production. In particular, the paper intends to deepen the cases of the *Costa dei Trabocchi Greenway* from Ortona to Vasto, the reuse of the abandoned Fano-Urbino railway, and the reopening of the historical Avellino-Rocchetta Sant'Antonio railway line, as ongoing examples of different design and management approaches in the Italian territory.

Keywords: urban regeneration, landscape, fragile territories, resilience, minor railways.

1. Territorial regeneration and re-appropriation of common goods: cultural identity, environment quality and universal accessibility

Urban and territorial regeneration continues to be a central issue of the debate of the national and international political agenda (Toledo Declaration, 2010; Italian National Strategy for Inner Areas - SNAI, 2015; Programma Periferie 2016), although it is a longstanding topic for European countries. The discussion concerns the different approaches to territorial governance and stimulates forms of public-private partnership, supported by strong public governance [1], aimed at promoting new integrated and multi-scalar strategies inspired by the principles of sustainability and resilience [2]. In this framework, territorial heritage, defined as "the ensemble of long-lasting structures produced by the co-evolution between the natural environment and the human settlements, whose value for present and future generations is recognized" (LR Toscana 65/2014) places environment, landscape and historical permanence, seen as common goods, at the basis of a new ethical development model [3], indispensable to preserve territorial contexts and populations, enhancing their cultural identity.

The new strategies are the result of the evolution of the endogenous references of the urban planning discipline, declining a greater awareness of territorial complexity into analytical and design categories. Furthermore, the current strategies assume the responsibility towards the exogenous urgent issues, connected to the environmental and socio-economic global change [4]. In particular, the social and

environmental risks linked to the abandonment of productive structures and infrastructures, and, at the same time, their enormous potential in terms of cultural and landscape enhancement and technological innovation, stimulate urban planning in the research and experimentation of new resilience paths, aimed at turning territorial fragility into regeneration opportunities and design creativity [5].

Therefore, the evolving paradigms in terms of territorial governance, propose an integrated vision to face the reuse of disused infrastructures, and require the overcoming of sectorial approaches to mobility, environment, landscape and land use planning.

Certainly, these approaches find a convergence in the integrated strategies that refer to new design categories (*vias verdes* or *greenways*, *ecological matrix*, *green infrastructures*) for the multi-scalar construction of inclusive and nature-based solutions for public spaces, supported by European funding channels (ERDF 2014-2020, Horizon 2020) and in the innovative national strategies aimed at promoting new forms of sustainable and inclusive mobility (Laws No. 128/2017; 2/2018).

In fact, in Europe, the continuous disciplinary advancement and experimentation on the issues regarding territorial and urban regeneration [6] aims to refine interpretative and design categories, strategies and instruments to interpret and govern the *inverse city* [7] made up of disused places, *wastescapes* [8] and *drosscapes* [9], drivers of a collective memory, able to recycle (PRIN Re -Cycle Italy) and to overcome the concept of past ruins to become the new *palimpsest* [10], for a capillary territorial revitalization.

Thus, the re-appropriation of common goods, universal mobility and environmental fruition become contemporary rights [6], declined starting from the instances coming from territorial contexts and local communities. Furthermore, these goals foster new institutional geometries and forms of participation and cooperation for the network management of the places of memory and local identity, able to revitalize the economies weakened by the crisis and to reconnect fragmented ecological and landscape frameworks.

2. From abandonment to valorisation. New perspectives for resilience paths

2.1 Italy and Spain. An ongoing research project

The complexity of territorial processes and the multiplicity of contemporary challenges underline the need for a reorganization of the methodological and operational references necessary to put in place integrated and inter-scalar regeneration strategies aimed at bringing these dismissed infrastructures "from background to figure", moving towards resilience paths.

In this framework, the consolidated urban planning debate refers to three complementary perspectives [1]:

- a first *structural* perspective identifies the regeneration of the railway network as an opportunity for socio-economic revitalization of the inner areas and for territorial rebalancing, starting from a relaunch of a public mobility structure, promoting the contemporary "right to mobility", through fair levels of universal accessibility at the territorial scale;

- a second *morphological* perspective [11] focuses on the regeneration of the railway network as a reconfiguration of a multi-scalar and landscape sensitive public space, enabling the valorization of historical and natural components, and the mending of material and immaterial cultural relationships to strengthen collective identity;

- a third *ecological* perspective looks at the regeneration of the railway network as a driver of sustainable development and environmental reclamation, turning these infrastructures into gray and green integrated networks [12], able to promote new forms of sustainable mobility and new eco-friendly collective values.

The ongoing research project, founded by Sapienza University "*Percorsi di resilienza. Il riuso e il rilancio delle ferrovie minori per la rigenerazione dei territori fragili. Esperienze in Italia e Spagna*" aims to respond, in an international overview, to several interdisciplinary goals of contextualization and operativity, and then experimentation, in order to define guidelines for the reuse or relaunch of minor rail networks in fragile territories.

Therefore, the research is declined into three phases, corresponding to the three disciplinary goals. The first is aimed at the contextualization of the issues related to the inner territories, in order to underline the complex relations between environmental, cultural, socio-economic and infrastructural fragilities that foster processes of abandonment.

The second phase deepens the regeneration strategies, tools and procedures that enable the reuse or relaunch of dismissed railways, combining the valorization of natural, traditional and cultural features with the innovation of mobility and production models. The reflection is supported with Italian and Spanish case studies.

This paper presents three Italian case studies related to the *Costa dei Trabocchi Greenway*, being implemented from Ortona to Vasto; the Fano-Urbino Greenway and the Avellino -Rocchetta Sant'Antonio historic railway, in the framework of the first and second phases of the research, towards the definition of the guidelines (third phase).

In consistence with the research methodology, the three case studies focus, in particular, on the contrast between the forms of fragility and the significant landscape and identity values of the investigated

territories. Furthermore, the study deepens the territorial strategies characterized by integrated and "resilient" design approaches for the reuse of railway lines, describing procedures and cooperative tools. The three practices also show how the public and private actors involved and the available funding channels are indispensable for the feasibility of the interventions, underlining the following aspects:

- Analysis of the characteristics of the territory, aimed at highlighting the ecological and socio-economic fragility [13], the conditions of marginality and abandonment, and, at the same time, the cultural and identity value of the landscape components;
- Study of the planning strategy of "resilient" regeneration aimed at: promoting a network of historical and naturalistic paths to encourage sustainable tourism and landscape valorisation [14] [15], re-appropriating and networking of common goods within a landscape project as a local endogenous development project [16] [17], fostering an universal and intermodal mobility system as a structuring public network for the protection of the territory and the socio-economic revitalization able to overcome marginality and abandonment [18] [19];
- Identification of actors, tools and procedures in order to highlight the growing availability of funding sources at all institutional levels [20] [21].



Fig. 1: The Costa dei Trabocchi Greenway

2.2 The Costa dei Trabocchi Greenway. The reconnection of ecological networks and historical landmarks

The project of the *Costa dei Trabocchi Greenway* constitutes a unique opportunity for the regeneration of the Adriatic coastal area of the Province of Chieti, from Ortona to Vasto and for the valorization of its natural and cultural heritage.

The former railway runs between shores and impervious hilly landscapes, crossing Protected Natural Areas and Sites of Community Importance characterized by scattered historical and natural landmarks and peculiar architecture strictly related to the economic and cultural activities of the Abruzzo region.

On one hand, the gravelly mouths of the rivers, the sandstone bluffs and the steep cliffs constitute a natural habitat of high ecological value that has brought to the delimitation, for instance, of the *Riserva Naturale Regionale Lecceta di Torino di Sangro*, the *Riserva Naturale Regionale Punta Aderci*, the *Riserva Naturale Regionale Marina di Vasto* connected by the proposed delimitation of the *Parco Nazionale della Costa teatina*. On the other hand, this natural context is also characterized by a particular hydrogeological instability and very low accessibility, which limits the potential of the development of tourism.

Furthermore, the former railway path is marked by historical milestones, as the Aragonese Castle, which stands on the *Pizzuta di Ortona* overlooking the Adriatic sea from 1492. The Castle has been involved as a theatre of historical wars until 1943 with the famous *Battaglia di Ortona*, but it is nowadays a significant common good and its tours represent irreplaceable panoramic points of great value, whose knowledge and fruition is a very challenging goal in order to valorize this indispensable stop for tourist and scholars.

In addition, this shore is marked by the presence of the *Trabocchi*, "imaginative fishing machines" described by D'Annunzio in the "Trionfo della Morte", hanging over the sea towards the currents "with its hundred limbs". The Trabocco represents an icon of the vulnerability of the coastal territory and, at the same time, the element of permanence and continuity with a possible rebirth of this territorial area starting from a rethinking of the infrastructural choices, accompanied by the mending and the reconfiguration of functional, morphological and eco-landscape relationships.

In this framework, the project of the greenway arises from the reuse of the Ortona-Vasto disused railway, abandoned since 2005, whose closure has been connected to the vulnerability of this territorial scope intrinsically linked to its naturalistic character.

The re-use of the dismissed railway involves, in the construction of the Green Adriatic Corridor, a part of the original path of the Adriatic railway line (Ancona-Lecce), which became operational in 1864 and was decommissioned in successive phases, between 1985 and 2005, following the construction of an alternative plan of the line, built further upstream than the coastal route [22]. A path of 40 kilometers through territorial area recognized as a strategic scope at all levels of planning and design and in every sector, for the opportunities related to the valorisation of the territorial identity, the defence of the territory and the sustainable revitalization of local economies.

The integrated and inter-scalar planning strategy put in place for this practice is rooted in the PTCF (*Piano Territoriale di Coordinamento Provinciale*) of Chieti approved in 2002, which identifies “the Costa teatina” among the main territorial projects, in line with the QTR (*Quadro Territoriale Regionale*). This planning provisions have fostered the preliminary project of the *Via Verde* (2008) developed in the project implementation by Cogepri Temporary Joint Venture of the Costa dei Trabocchi Greenway (2017) promoted by the Province of Chieti. The project has been financed with the FAS funds [23], within the agreements signed in the *Protocollo di Intesa* between RFI, PCM, Invitalia, Abruzzo Region, Chieti Province, the eight Municipalities involved (and other stakeholders) in 2011.



Fig. 2: Greenway Costa dei Trabocchi from Ortona to Vasto (Abruzzo Region)

The interventions connected to the Greenway combine the construction of the cycle and pedestrian path with the restoration and reclamation of the cliffs subjected to strong erosion and siphoning, the regeneration of the autochthonous plant habitat, counteracting landslide phenomena and environmental degradation, also due to abandonment of the infrastructure. The project is also aimed at providing support for "universal accessibility" of the coastal line by technological support and inter-modality.

The main part of the rail network was purchased from RFI, but the destiny of the railway stations, warehouses and lodgings is still open. Indeed, Municipalities consider these artefacts as strategic for the realization of tourist services, even if they have today only the availability for their use until 2020. Nevertheless, this peculiar heritage of railway architectures is fundamental for the construction of a *territorial infrastructure of services*, irreplaceable for the revitalization of the socio-economic system and the preservation of cultural identity of the coastal area.

2.3 The Fano-Urbino railway: the sustainable fruition of cultural landscapes as local development project

The reopening and reuse of the abandoned Fano-Urbino railway line, as strategies for enhancing the Metauro Valley, concerne different issues, such as the recovery of railway routes with high historical and landscape value, soft mobility and the regeneration of urban centres.

The Fano-Urbino railway is made up of two lines, which had different origin and development, but connected in the *Fermignano* station. The entire line was severely damaged during the end of World War II, and it was brought back into service, between the 40s and 50s, under the management of *Ferrovie dello Stato*. The boom in private motorization of the 60s marked the destiny of the Fano-Urbino railway line, like other many smaller railways, in the framework of national policies funding other mobility models and reducing railway competitiveness. In 1987, despite a strong public dissent, the railway service was suspended and the line with its architectural heritage was abandoned, until the final closure in 2011.

The railway line runs parallel to the Metauro river and has kept intact the rail tracks and the historical-documentary artefacts, such as bridges, viaducts and tunnels [24], as well as the collective and identity value recognized by local communities. In fact, these places, a masterpiece of archaic richness almost intact, constitute a unique landscape for both naturalistic and cultural values, being the background of the Piero della Francesca *Montefeltro* diptych, portrayed the Dukes of Urbino, one in front of the other on the terrace of the *Pieve del Colle*, in the context of the wonderful *Valle del Metauro*.

The strong cultural value of the Metauro landscape is in contrast with the arising fragility of the places that brought the area *Montefeltro and Alta Valle del Metauro* to be far from the functional polarities, and characterized by degradation and depopulation processes [25] and consequently, to be recently included in the Inner Areas (SNAI).

In this context, the opportunity for the reopening of the Fano-Urbino railway line represents a possible driver for territorial regeneration, starting from a landscape, environmental and tourist perspective, which could give new life to this fragile territory. The Fano-Urbino is one of the few strategic transversal directions that connects the hinterland (Urbino) with the Adriatic coast (Fano) and that crosses territories with various levels of dynamism and catchment areas.



Fig. 3: Railway Valle del Metauro from Fano to Urbino (Marche Region)

Through a bottom-up process, the *Valle del Metauro Railway Association* [26] has been in charge of track maintenance and awareness-raising initiatives for more than twenty years, which led to the drafting of a rehabilitation project for the Fano-Urbino line in 2012, drawn up by the *Società Ingegneria Pegaso*

and Sistema Ingegneria. This project represents an example of sustainable intervention, according to the principles of reversibility, gradualness and compatibility, with the aim of reaching step by step the reactivation of the railway service, for the economic and territorial revitalization.

The first phase of the project involved the relaunch of the line from a tourist point of view, by using iron cycles and undertaking safety works on the route, with particular attention to bridges and tunnels. Thanks to this first step (500.00 euros of expected investment), it would have been possible, in the second phase, to proceed to the most important works along the line, in order to allow the circulation of historical trains, for tourist use, and make usable some of the existing stations. The third and fourth phases would then be the re-activation of the rail service for public local transport and total re-use of the infrastructure.

This project was consistent with the provisions of the previous *Piano Regionale Trasporti, Mobilità e Logistica* (2012), which envisaged the reactivation of the line as a territorial light rail, and anticipated the Law 128/2017 for the establishment of Tourist Railways.

With this law, the line was included among the 18 "disused or being disused railway lines in areas of particular naturalistic or archaeological value" with a project of 35 million euros.

The technical characteristics of the line and the territories it crosses make the line an ideal candidate for historical-tourist use, also in anticipation of the possible effective reactivation of the service as a light rail. However, the persistent lack of funds and the uncertain conditions of some sections of the line are the reasons why, after more than one year after the law, the works are not assigned.

In the meantime, it is also taking shape the opportunity to convert the line into a greenway through the drafting of a *Biciplan*, within a cultural revolution that promotes sustainable mobility, slow tourism and life quality, in accordance with the Law 2/2018.

The conversion of the line into a greenway, could appear, on the one hand, as a missed opportunity for a deeper restructuring in terms of tourism, in view of the overall reactivation of the train service, as proposed by the *Valle del Metauro Railway Association*. However, on the other hand, the temporary and reversible reuse of the route will guarantee territorial presidium and landscape valorization, fostering the opportunity for a flexible morphological and functional reconfiguration of the railway architectures, combining the accessibility and the Right to mobility with a resilient strategy for the widespread cultural heritage.

2.4 The Avellino-Rocchetta Sant'Antonio touristic railway: a contemporary backbone for the territorial mending and revitalization

The Avellino - Rocchetta Sant'Antonio railway line is included among the "particularly valuable tourist railways" listed in the National Law no. 128/2017, because of the high historical and cultural values and landscape unicity of Irpinian territories.

The tortuous path of the line, following the course of three rivers, *Sabato*, *Calore* and *Ofanto*, crosses three regions, Campania, Basilicata and Puglia, and runs through vineyards, chestnut trees, cultivated hills and wooded areas through a fragile territory of perched villages almost abandoned and forgotten, hard hit by the 1980 earthquake, which is still imprinted in people memories and places.

The story of the railway line and the history of Irpinia appear to be closely related, starting from the maiden voyage of October 1895, that occurred with twenty years of delay due to bureaucratic obstacles, economic and political problems that the Administration had to face. The railway soon assumed the role of principal connection between Avellino and the constellation of small villages arisen along the river valleys.

Despite this, the first difficulties related to the absence of a true infrastructural system and of transversal connections between the line and the other inhabited territories, the length of travel times due to the route, and the few municipal investments in infrastructures, began to make difficult the use of the line. Moreover, during the 60s, with the boom in mass motorization, the competitiveness of the line was seriously reduced by the construction of the Naples-Bari motorway, a symbol of the mobility policies assumed by the State. The new motorway, which initially should have followed the Naples -Benevento-Foggia route, was diverted to Irpinia, with a path diametrically opposed to railway path [27] and which in fact began to empty its catchment area.

From the 1950s the economic situation in the region had also led to a strong emigration process towards other Italian regions, and the railway became the symbol of this strong movement of people towards Naples, and from Naples to the whole world, increasing the fragility and marginality of these lands. However, the tremendous earthquake of the 1980 caused nearly 3,000 deaths and more than 280,000 displaced people. In the context of this event, that was the bearer of a human and territorial wreckage, for settlements and communities, the railway line was seriously damaged. Nevertheless, the line was quickly restored, by replacing the damaged stations with anonymous prefabricated concrete structures. Despite this, in the reconstruction policy implemented by the State, in line with the previous policies of the 60s motorization boom, the investments favoured road transport, through the construction of new highways, not connected to the railway line and to the rail transport system.

From the early 90s the gradual abolition of some train stops and the replacement by bus, added to the financial cuts for maintenance, led to the final closure of the line in December 2010. However, the strong historical value and the unique Irpinian landscape, fostered in 2007 the initiative *Trains of Irpinia*, which enabled tourist trains services to reach the villages during events and festivities, highlighting the opportunity that this line offered in terms of tourism. A few years later, in 2014, the *Piano Territoriale di Coordinamento Provinciale* (Territorial Plan of Provincial Coordination -PTCP) of the Province of Avellino, included the railway line as a “Soft Mobility Path of historical, architectural and landscape interest at a territorial level”, defining it as a priority project in the General Report. The planned intervention has brought to the adaptation of the Avellino-Rocchetta S. Antonio railway and its promotion as route of touristic interest, through an agreement between the Province, the Region, the Railway Authority, Municipalities, communities and stakeholders and a feasibility study for the evaluation of different alternatives: as a greenway, restoring the railway service, or adopting mixed solutions. The strategic role of the line is emphasized by the Plan guidelines for some specific areas, such as for Alta Irpinia (one of the leading areas of the SNAI), where the enhancement of the villages, and their eno-gastronomic chains, are linked to the reuse of the route into a tourist key.



Fig. 4: Railway from Avellino to Rocchetta Sant'Antonio (Campania Region).

In 2015, thanks to an agreement between regional authorities and the *Ferrovie dello Stato -FS Foundation*, the Avellino –Rocchetta Sant'Antonio railway line was included in the project “Binari senza tempo” (timeless tracks) [28] - an initiative of FS aimed at rediscovering ten railway lines of particular landscape, historical and cultural interest – also due to the close territorial connection existing between the line and some of the cycling and slow travel corridors of national interest. An example is the 500 km long *Ciclovia dell'Acqua*, that connects Caposele in Irpinia, in the Province of Avellino, to Santa Maria di Leuca and which is part of the National Tourist Cycle Route System, promoted by the Ministry of Infrastructure and Transport and the Ministry of Cultural Heritage and Activities.

“Binari senza tempo” and the relationship with the major national cycling tourism projects gave the line a new identity and a new territorial relevance. Because of these initiative and thanks to the associations involved, the Avellino - Rocchetta Sant'Antonio line has therefore been included in the list of lines for “the establishment of tourist railways through the reuse of disused lines or in the process of disposal of particular naturalistic or archaeological value” of the law 128/2017.

Nowadays, unlike what happened for the Fano-Urbino line, all the 118.7 km of the line have, in fact, been restored and along the tracks run tourist trains, a project made possible by the synergy between local authorities, the FS Foundation and the Campania Region [29]. Today, the historic trains pass through a territory rich in history and signs of memory, an agricultural landscape, of orderly crops and

ancient farmhouses, strongly characterized by naturalistic values. They cross the Regional Park of the Monti Piacentini, the Monte Acellica (Ofanto River source), the WWF oasis of the artificial basin of Conza della Campania, the Bosco di Zampaglione and the artificial basin of San Pietro. The small towns and villages perched on the hills, less and less populated and more and more fragile, are the custodians of small cultural treasures, archaeological areas, castles and fortification systems, small rupestrian churches, without counting the works that the skilful construction of the railway infrastructures had left abandoned in the area. It is indeed a line that can be considered industrial archeology, with a hundred viaducts that can be considered true engineering masterpieces, such as the "Ponte Principe" near Lapio or the "Milan" viaduct in Atripalda, as well as some tunnels that allow the railway to make the route less winding. The railway, with its new tourist use, aims to share this historical and environmental heritage being the bearer of an innovative and original way to territorial fruition [30].

The Avellino- Rocchetta San Antonio line represents, on the one hand, an emblematic case for the extreme social, economic and physical fragility of the territory of Irpinia, that today strongly looks for a change, making itself the promoter of new practices and participation activities that focus on valorisation of environmental and infrastructural systems, overcoming the fragility of the line itself, symbol of a promise of development, a channel of emigration and abandonment, witness of seismic catastrophes and today, a symbol of new rebirth.

On the other hand, the reuse of the line has witnessed the arising of an inter-institutional cooperation, starting from the communities and associations of citizens, through a common thread that connects the local projects, the territorial planning and the national laws, towards a role of infrastructure as the bearer of new economies and new collective values.

3. Territorial regeneration. Toward new operational references and new collective values

The three case studies demonstrate how the multi-scalar construction of public space, with particular reference to soft mobility, assumes an arising importance for the regeneration of "fragile" territories from a physical, environmental and socio-economic point of view, seizing the potential of these paths as a support for sustainable mobility in high naturalness contexts and as "territorial figures" for the enhancement of cultural heritage and landmarks, as structuring axes for inclusive functions and green economies.



Fig. 5: The re-appropriation of common goods: three case studies

Starting from the outcomes and proposals of these experiences, the reuse of railway lines appears as the potential bearer of an integrated approach to the construction of ecological, infrastructural and social networks that responds to the following resilience priority objectives:

- protection and enhancement of the cultural and natural heritage, as a answer to the vulnerability and abandonment phenomena of the sea coasts and river banks, of the historical centers and landmarks, spread throughout the territory, pursued through coordinated consolidation and environmental interventions, re-naturalization, restoration and re-use of identity artefacts;
- re-activation of sustainable local economies, as an answer to depopulation phenomena, through the development and networking of green economies, between tradition and innovation, compatible with territorial awareness, landscape enhancement, touristic fruition, and, at the same time, the strengthening of eno-gastronomic chains capable of revitalizing local production;
- promotion of citizens' rights to welfare and mobility, as a solution to social imbalances that impoverish the inner areas, through the re-use of infrastructures as a social fixed capital and the "universal accessibility" as a collective re-appropriation of identity common goods.

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