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GRINS
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Spoke 7 "Territorial Sustainability"

WP3 – Area-Specific Planning

DELIVERABLE 7.3.4

Multidisciplinary Territorial Policy

Lab

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Executive summary

Establishing a multidisciplinary laboratory for territorial policies involving local stakeholders represents the Deliverable (D 7.3.4) of WP3 Area-Specific Planning (M24). The goal is to foster dialogue and support territories on issues related to territorial sustainability, attractiveness, and resilience, as developed in the GRINS project, as well as promote activities dedicated to training local stakeholders. Throughout its activities, the laboratory will utilize various multidisciplinary approaches, which are detailed in this document, and its efforts will focus on the different territorial typologies explored in WP3. The Deliverable is connected to the WP 3 objective of identifying challenges for transitioning to sustainable, attractive, and smart cities and territories. In particular, the main activities of the Deliverable, which were conducted in parallel by the research units of UNIBA, POLIMI_DASU, UNINA_DiARCH, and UNIBO, were necessary to address the following primary tasks of the WP3:

- Task 7.3.7, Design of area-specific strategies for gap/vulnerability reduction and equalization policies.
- Task 7.3.8, Training activities for local stakeholders and mobility managers.

Deliverable 3.4 is predominantly programmatic and will be enriched by the activities of various working groups across different territories. The ongoing activities include the implementation of the Milestone 7.3.4 *Field and in-lab experiments of different tools to promote sustainable mobility and territorial management* (M24) and are fully within the further *Release of n. 8 Case study Reports* (target 7.3.2, M30) and *Release of n. 4 Policy documents, one for each territorial typology* (target 7.3.3, M36), which are the final two targets planned by the project for the completion of WP3 activities.

The document highlights the multidisciplinary approach developed by the involved working groups. This approach includes transitioning from the global and national levels to the local and sectoral levels, where relevant information for the activities to be carried out by the end of the project (M36) is gathered. Furthermore, the ongoing activity aims to create a diagram of the involved actors, systematizing both those who have already participated in the activities and those who have their own networks to be activated in the future.

In the final section of this work, we present some representative cards related to applying the methodologies described in various real-world territorial contexts. The adopted methodology opens multiple possibilities and different ways of working while always maintaining a high level of dialogue with the territories and local stakeholders.

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1. Spoke 7 Territorial Sustainability

1.1 WP3 Area-specific planning

The WP3 intends to identify challenges for the transition towards sustainable, Attractive, and smart cities and territories, focusing on specific territorial typologies: inner regions, islands, large urban areas, and the so-called “Intermediate Italy,” (i.e., urban areas including mid-size cities and their wider polycentric and low-density urban systems). To this end, recent trends in living, working, mobility, and tourism have been considered to test their impact in different territorial areas.

In continuity with the activities already carried out for WP3, the activities of Deliverable 7.3.4 were requested to address the following main tasks:

- Design of area-specific strategies for gap/vulnerability reduction and equalization policies.
- Training activities for local stakeholders and mobility managers.

The first part of the work introduces the methodological framework to ensure a multidisciplinary approach, which includes the transition from global and national levels to local and sectoral ones. Meanwhile, the last part focuses on various experiences conducted in different territorial contexts across Northern, Southern, and Central Italy, detailing the local context and actors, the methodologies applied, the actions taken, and the impacts achieved in defining specific and timely strategies for reducing gaps and fostering balanced local development.

1.2 Deliverable 3.4 Multidisciplinary Territorial Policy Lab

The Multidisciplinary Territorial Policy Lab (MTPL) is detailed in the document titled “Annex 1, GRINS Project Proposal – Articles 10 and 12 of the Call”. This document outlines that one of the key objectives of the research is to design policies aimed at enhancing the accessibility and attractiveness of various territories, including cities, marginalized areas, islands, as well as contexts in Southern Italy. The goal is to improve these locations for residents, migrants, visitors, and managers of different economic activities while also addressing inter- and intra-territorial disparities at multiple scales (p. 64). The research prioritizes developing area-specific strategies to reduce vulnerabilities and gaps in territories and promote

redistributive policies (p. 75). A deliverable of the research will be the establishment of the Multidisciplinary Territorial Policy Lab (MTPL) by month 24 (p. 75). Additionally, by the same timeframe, the project plans to conduct on-field and in-laboratory experiments using various tools designed to promote sustainable mobility and land management, marking a significant research milestone.

The MTPL is designed as a collaborative laboratory that fosters dialogue and partnership while supporting territorial development. This includes activities focused on training and raising awareness among local stakeholders. The MTPL embodies the convergence of diverse approaches and a wealth of experiences, reflecting the variety within the working group, the different locations involved, and the relationships each university has with its own territory or adjacent areas where initiatives have been implemented. As a result, this initiative is inherently multidisciplinary, as it promotes the integration of various fields while simultaneously addressing multiple territories. Recognizing that the unique characteristics of each context serve as both valuable resources and significant challenges in planning and programming underscores the MTPL's mission: to support a wide range of territorial policies instead of prescribing a single political or strategic vision. The challenge lies in providing thoughtful and effective support that caters to the specific needs of each territory while also identifying opportunities to compare and replicate successful tools and strategies for application in other contexts regions.

1.2.1. Lab facilities and location

The MTPL is physically established in the Department of Economics, Management, and Business Law (DEMDI) of the University of Bari "Aldo Moro", representing an innovative place dedicated to analyzing, designing, and evaluating territorial policies, as established in the WP3 "Area-specific planning" of the Spoke 7. The lab provides a highly collaborative working space for researchers, local stakeholders, and students to develop concrete solutions to territorial challenges. This lab is open to all GRINS researchers and relevant stakeholders.

The MTPL is strategically located, ensuring easy access for students, faculty, and stakeholders. As shown in Figures 1 and 2, the spaces are designed to foster interaction and participation, and include:

- **Meeting and Presentation Room:** Equipped with a central table, a television with a camera for online meetings, and a projector for presentations and seminars.
- **Hybrid Meeting Tools:** With state-of-the-art technology, it is possible to organize workshops and meetings with in-person and remote participation.
- **Informal Spaces for Brainstorming and Networking:** Comfortable furniture designed to facilitate conversation and creative exchanges.

- **Multifunction Printer and Support Tools:** Producing operational materials and sharing research documentation.
- **Computers and other hardware and software facilities** for applied territorial analyses.



Figure 1 - MTPL meeting space



Figure 2 - MLTP meeting moment 1



Figure 3 - MLTP meeting moment 2

1.2.2. *Who is the MLTP aimed at?*

The MTPL caters to a wide range of users and stakeholders, each of whom can benefit from its resources and activities:

- a. **GRINS Researchers:** They benefit from a dedicated space for engaging with colleagues and specialists in the field. This environment fosters critical dialogue and the sharing of methodologies, allowing researchers to refine their work and improve the quality of results. Additionally, access to innovative techniques supports the development of advanced, interdisciplinary research projects.
- b. **Academic Staff:** The lab serves as a meeting point for sharing knowledge and exchanging ideas on advanced methodologies, available data, and innovative approaches to territorial analysis.
- c. **Public and Private Stakeholders:** MTPL serves as a reference point for collaboration on specific case studies and the development of new applications related to territorial sustainability.
- d. **Master's and PhD Students:** The lab provides unique opportunities for access to advanced technologies and methodologies, allowing them to conduct innovative and specialized research. Workshops and seminars are designed to enrich their academic and professional training.
- e. **Businesses:** MTPL represents a valuable resource for developing tailored techniques and applications, improving operational efficiency and competitiveness through advanced territorial analysis.

1.2.3. *Main ongoing activities*

The activities of the Multidisciplinary Territorial Policy Lab are designed to promote knowledge transfer and facilitate exchange among various academic and non-academic actors to develop effective and innovative territorial policies. In a context where integrating research and practical application is crucial, the lab aims to serve as a convergence point for cooperation between academia, local authorities, businesses, and the community, fostering shared and sustainable territory development. In line with Spoke 7 WP3 objectives, MTPL intends to identify and analyze challenges for the transition towards sustainable, attractive, and smart cities and territories with a focus on specific territorial typologies identified in the project. Recent trends in living, working, mobility, and tourism (e.g., smart working, the "15-minute city," smart cities and smart mobility, digital tourism, etc.) have been considered for assessing their impact in different regions areas.

The project partners have conducted numerous field and in-lab experiments. Therefore, the 24-month timeline should not be viewed as a strict deadline for completing the work, but rather as a milestone indicating what has been developed up to that point and what will continue to be implemented. Different institutions involved in Spoke 7 conducted field experiments using diverse approaches and tools typical of deliberative processes for engaging territorial communities stakeholders. The various research units produced prototype models that were then integrated into the vulnerability maps (WP3, Deliverable 7.3.2). They carried out analyses incorporated into the gap analyses (WP3, Deliverable 7.3.3) and conducted studies on sample territories that were included in the Repository of Solutions for Monitoring and Enhancing Local Attractiveness and Resilience in Specific Areas, delivered at 12 months (WP3, Deliverable 7.3.1). In all cases, the activities developed were preparatory to defining the methodological process that characterizes the Multidisciplinary Territorial Policy Lab.

Training Initiatives

The MTPL periodically organizes training activities for PhD, Master's students, Local Regulators, and Stakeholders, focusing on territorial policy analysis, sustainability, and resilience. These training events provide the participants with the theoretical and practical tools necessary to tackle the challenges of territorial management and development. Moreover, the interactive and applied approach of the workshops allows students to engage directly with local realities, putting into practice the knowledge acquired and contributing to solving real problems related to territorial management.

In particular, specific courses have been organized within the University of Bari initiative, "*Competenze Trasversali 2023-2024*" and within the activities of the Knowledge Center for Territorial Data (KCTD) -Deliverable D1.2, WPI Spoke 7- on:

- **"Urban planning laboratory"**. The laboratory pursues the objective of providing students and local stakeholders with the theoretical and applicative elements for the knowledge and understanding of issues relating to urban planning and territorial governance, both in their general characteristics and concerning specific topics that are of particular relevance and current relevance, such as the theme of sustainable development, smart cities, mobility, sustainability, resilience, reduction of inequalities and decarbonization. It dealt with policies and tools to make cities green, smart and inclusive: in other words, cities of the future. The course also delves into the figure of the mobility manager for public and private institutions. The study activities have been characterized by a theoretical-practical approach: case studies have been presented on various topics that cut across multiple disciplinary fields (economics, sociology, psychology, agriculture, etc.).
- **"Laboratory of analysis and evaluation of territorial public policies"**. The laboratory intends to provide the theoretical, methodological, and applicative bases for the

analysis of data and the study of the main evaluation techniques of public policies in various fields of application concerning the impact on the territory, on citizens, on businesses and on other public and private organizations. The objective of the course is to familiarize students and local stakeholders with how to organize data concerning a research idea and which methodologies to use based on the availability of the latter, as well as understanding "what works and why" concerning a public policy. The course has been divided into two parts: the first part aims to provide the basic tools necessary for the management and analysis of data using statistical software and the use of different econometric methodologies, such as simple regression, multiple regression, and panel data analysis (fixed and random effects). The second part of the course aims to illustrate and explain the functioning of the main counterfactual evaluation techniques of public policies, such as, for example, the difference in difference, regression discontinuity design, matching, on which group exercises will be conducted (team working) on various statistical software.

- **"Behavioral economics laboratory"**. The lab aims to provide the theoretical and applicative bases for the study of the value individuals attribute to goods and services for which direct observation in the market is not possible, as they have not yet been realized. After having defined the concept of preference (stated and revealed) and its implications on the determination of demand and the economic values at stake, the various techniques are useful for constructing choice scenarios (surveys) and implementing estimates through statistical software. These methodological tools are widely used and applicable to various economic and social sectors. During the course the students and attendees have been divided into groups, will work on real data/simulations, and create presentations. The course aims to provide a set of transversal skills in data analysis. It is aimed at increasing learners' autonomy in using statistical software for econometric analysis open sources.
- **"Economic-territorial planning laboratory: Planning sustainable tourism development"**. The laboratory intends to provide learners with the theoretical and applicative bases for the economic-territorial analysis of the tourism phenomenon and the qualitative-quantitative study of the impacts of tourist demand on destinations. Participants have been able to: i) identify and use the different statistical reference sources for measuring the demand for tourist goods and services, both in terms of visitor flows and tourist spending; ii) understand the main explanatory variables of the tourism phenomenon, read in a multidisciplinary key from multiple angles, relating to the visitor economy, the place-based (environmental) approach and the community-based (social) approach; iii) calculate the most valuable indicators to quantify the multiple impacts of tourism and measure the real contribution of the tourism sector to the local economy, net of the diseconomies caused by excess tourism (overtourism) and the underground economy. The skills acquired during the course are functional to the

ability to design appropriate tourism policies at a territorial level. The laboratory activities include an active learning methodology characterized by a theoretical-practical approach by carrying out practical exercises in the classroom and applying the methods presented to real case studies relating to the Italian territory.

Several students and stakeholders have attended these courses. The University of Bari Aldo Moro also funded for the academic year 2024-2025 new courses on “Cost-benefit territorial analysis (ABC): Programming, evaluation, and monitoring of projects and services subject to public funding.” and “Economic-territorial planning laboratory: Planning sustainable tourism development” that will also be part of the GRINS Spoke 7 initiatives.

Workshops and Thematic Seminars with Local stakeholders

MTPL regularly promotes workshops and thematic seminars for networking, knowledge transfer, and dialogue between GRINS researchers, stakeholders, regulators and students. These events provide an essential opportunity for dialogue among experts, professionals, and local operators, encouraging discussions on key issues related to territorial development, sustainable planning, and public policies. During these events, participants present and discuss their latest research, contributing to the scientific and practical debate and strengthening the link between theory and concrete application. The workshops and thematic seminars focus on crucial topics, such as using innovative methodologies (e.g., artificial intelligence and machine learning) applied to territorial management, environmental sustainability, urban resilience, and mobility. These events represent a significant opportunity for professional and academic development, stimulating the dissemination of new ideas and innovative solutions. Furthermore, they facilitate the creation of interdisciplinary networks among academics, researchers, policymakers, and other local actors who can collaborate to develop more effective and sustainable territorial policies. Several important EU and international Universities have been and will be involved in the MLTP lab activities (among the others, the University of Malta, University of Gent, VU University of Amsterdam, and the Senseable City Lab- Massachusetts Institute of Technology (MIT)).

Research activities and Living Labs

A distinctive aspect of MTPL activities is the concept of Living Labs, which serve as experimental spaces where innovative solutions are tested in real-world contexts. These labs actively involve the local community and provide an environment where territorial policies and development strategies can be practically implemented and evaluated. Living Labs promotes a participatory approach to research, allowing citizens to be directly involved in decision-making and development processes, creating a direct link between scientific research and the improvement of the social and economic conditions of the

territory. These innovation spaces enhance territorial resilience and sustainability, fostering cooperation between research, local administrations, and communities.

Furthermore, empirical analysis and data collection have been and will be necessary for a comprehensive analysis of the phenomena and the research activities identified in WP3 as with the other GRINS Universities partners like:

- Integrate data from WPI with local-level data and analysis to define detailed vulnerability maps for specific case studies;
- Identify infrastructures and services digitalization policies to reduce divides between city centers, suburbs, and outskirts;
- Analyze the role of infrastructures and related services on urbanization, residential choices, mobility patterns and choices, firms' relocation decisions and urban economic integration of inner and marginal areas, also through lab-in the field experiments and design thinking approach involving local actors;
- Estimate the additional costs (network infrastructures, energy, transport) due to insularity or peripherality conditions;
- Investigate tourists' characteristics, preferences and expenditures with specific attention to cultural, cruise and nature-based tourism;
- Measure residents' and visitors' satisfaction levels and create real time indicators using administrative data, integrated with survey data and data collected through ML techniques from media, social networks, apps, etc.;
- Design of area-specific strategies for gap/vulnerability reduction and equalization policies;
- Training activities for local stakeholders and mobility managers;
- Specific hardware (laptop, supercomputer, other hardware equipment necessary for the analysis), licenses, and data have been collected and bought to analyze the minor granular level.

Through these activities, MTPL aims to be a reference point for the interaction between the academic community and the territory. The lab facilitates continuous dialogue between research and practice, stimulating an innovation process that responds to the concrete needs of local realities. In this context, MLTP becomes a catalyst for developing more inclusive, sustainable, and adaptable territorial policies, contributing to improving the living conditions of the communities involved.

Future Perspectives and Additional Activities

MTPL is continuously evolving, to expand its activities to maximize its impact. Future initiatives include:

- **Knowledge Cafés:** Informal meetings bringing together experts, professionals, and citizens to share knowledge on territorial policies.
- **Training activities for local stakeholders and mobility managers:** Advanced training paths for local stakeholders, professionals, and young researchers, offering practical skills and networking opportunities on the challenges for the transition towards sustainable, attractive, and smart cities and territories with a focus on the specific territorial typologies identified in the project.
- **Spin-offs:** The lab will encourage the creation of spin-offs, innovative companies born from research projects. This will promote entrepreneurship and create new business opportunities linked to territorial data and innovative technologies.



Figure 4 – MTPL Coffee Corner



Figure 5 – Meeting with local stakeholders and municipal regulators at MTPL

As shown in the images (Fig. 4 – 5), the lab has already played a crucial role as a venue for organizing events dedicated to involving local stakeholders and regulators, confirming its commitment to direct interaction with local territorial realities. These events saw the active participation of representatives from numerous municipalities in Puglia, who were involved in structured sessions aimed at strategic planning and participation in research projects and natural experiments.

These meetings provided a valuable opportunity for operational discussion, during which local actors, sitting around the table, discussed fundamental social dynamics and territorial issues affecting their communities. The approach adopted prioritized dialogue and sharing experiences, enabling participants to identify innovative solutions and effective collaboration methods jointly.

A key element that emerged from the working tables was the focus on the benefits municipalities can gain by joining the research projects promoted by the lab. The main

advantages discussed were privileged access to advanced territorial data and tools for analysis and planning, the opportunity to participate in projects integrating advanced scientific methodologies to address local challenges and the strengthening of the relationship between local governance and the community through evidence-based territorial policies.

These meetings also highlighted the importance of a participatory approach, where municipalities are not merely recipients of research activities but active partners in their definition and implementation. This model of cooperation, integrating academic and institutional contributions with the specific needs of the territories, promotes a more inclusive decision-making process and greater effectiveness in the actions implemented.

The organized events, as evidenced by the images, represent a concrete example of how the lab promotes synergy between academia, local institutions, and communities, outlining a path of sustainable and innovative territorial development.

1.3 Background, interpretations and experiences for a methodological framework

The development of a MTPL is one of the objectives of Spoke 7 of the GRINS project, and it addresses issues related to territorial sustainability through a systemic and incremental methodological approach oriented towards developing strategies for specific territorial areas. The MTPL is an integrated methodological approach oriented towards the knowledge of territories, the valorization of acquired knowledge, and the capacity to generate impacts through policy and project innovations. The workshop dimension is an experimental and collaborative approach that primarily sees synergy between multiple disciplinary knowledge and dialogue with stakeholders, local actors and communities. In this sense, it seeks to understand how to make strategic choices and public policies more community-based, differentiated according to landscape types and built heritage, local hazards and vulnerabilities, and socio-economic and cultural contexts.

The MTPL represents a broader interpretation of the concepts widely used in the Living Lab and Policy Lab literature, which can be considered a user-centered ecosystem based on a systemic approach of co-creation that integrates research and innovation processes in communities and real-life contexts. The MTPL is an arena for public engagement. It sees the succession - in an elastic and dynamic order dependent on the progress of the research path itself - of in-lab and field experiments.

Its main objective is to build a network between the local communities of a given territory, the stakeholders involved, and the world of research to usefully collaborate to identify effective and shared policies and project strategies to improve territorial sustainability.

In this sense, researchers become facilitators of processes and mediators who build imaginaries and suitable strategies. Local knowledge and scientific knowledge—both valued in their richness and plurality—must represent the starting and finishing points of the activity in an incremental and evolutionary process.

This means replacing a top-down approach with a collaborative strategy focused on skill enhancement and, most importantly, knowledge of the territories to assess the impacts of current projects and the addition of new ones. In fact, transformation strategies and projects must be rooted in places and communities, effectively interpreting a multidimensional complexity that cannot reduce themes or consider partial dialogue that overlooks the many stakeholders present in a territory, who are essential for defining lasting visions. In conclusion, the Multidisciplinary Territorial Policy Lab aims to work on opportunities and resources, as well as vulnerabilities and gaps, to intentionally and projectively guide and address the complex transitions underway.

In this context, the role of research is crucial as it represents state-of-the-art knowledge. MTPL can be an opportunity to share this knowledge by bridging the gap with the community and stakeholders. At the same time, it can also provide the possibility of integrating concurrent research and innovation processes within a public-private-people partnership through the co-creation, exploration, testing, and evaluation of innovative ideas, scenarios, and concepts in real use cases. Such use cases involve user communities, not only as observed subjects but also as sources of co-creation. The MTPL could be accessible to everyone, regardless of age, education, physical condition, or social status. It promotes clear communication to convey scientifically accurate information in a simple and accessible manner. In reference to interpreting the MTPL as a laboratory of laboratories, the final objective of the WP is to systematize the multiple interpretations and experiences conducted by different research units, also triggering possible intersections and integrations to further enrich the broad methodological framework in a feedback loop logic.

1.3.1 The POLIMI interpretations and research experiences

The Politecnico di Milano research group is keen to investigate the concept of Intermediate Italy from various perspectives. This exploration encompasses an examination of built heritage, where market dynamics have created imbalances in inhabited areas; an analysis of infrastructural settings, which are essential for regional liveability but have been compromised by sector-driven policies that lead to incompatible structures; an inquiry into landscape and agricultural practices, recognizing that agriculture continues to shape the landscape in many regions, while contributing to biodiversity depletion and diminishing ecological complexity, even as the number of workers in agricultural production declines; and a reflection on the energy transition that is studied as an opportunity as well as an issue that is bringing considerable environmental challenges due to the increasing demand for renewable energy. The MTPL is envisioned as a platform designed to strengthen

research efforts and foster active engagement with local stakeholders, leveraging research findings to provide critical insights for further advancements.

The methodology adopted in developing the workshop will consist of the following phases, which are not necessarily consecutive. These phases are designed to be developed over time in a flexible sequence, aiming to maximize the involvement of local communities.

Territorial framework. Significant efforts will be dedicated to reconstructing a comprehensive understanding of the current state of locations, settlements, and environmental systems. These efforts will encompass a detailed cartographic description of the settlement system, infrastructural patterns, and the land use mosaic. Particular attention will be given to the interaction between the anthropogenic environment and natural elements, illustrated through reports, maps, and databases that collectively provide a cognitive representation of the current conditions of these areas. A comprehensive understanding of the local context will also be pursued through dialogue with municipalities and local associations. Municipalities play a vital role in supplying essential geographic and spatial data, utilizing their extensive region knowledge to inform our research and ensure our findings are well-grounded. Meanwhile, local associations offer valuable insights into the community's social fabric, given their connections to schools, educational institutions, and various community organizations. This collaboration allows the research team to better understand the specific challenges and opportunities the community faces.

Vision and Scenarios. The process of transforming a territory includes various timeframes, each characterized by different levels of uncertainty. Therefore, part of the effort will focus on creating visions and scenarios. A vision represents a broad and intricate concept that guides the community toward a shared goal, rather than offering a detailed plan. It outlines a pathway and strategies for achieving that goal without defining specific rights and responsibilities. This vision remains flexible and open, though not every action can be included within it. It empowers local stakeholders to evaluate proposed actions, allowing them to accept, modify, or reject these actions based on their logical and substantive coherence. In contrast, a scenario is a hypothetical representation of how future events or situations may unfold. It serves as a crucial narrative that helps illustrate the consistency of the formulated hypotheses. This approach effectively addresses the challenges faced by contemporary territories in a structured and thoughtful way, promoting informed and collaborative decision-making.

Strategies and Resilient Design. A key component of the adopted methodology involves guiding agencies and authorities by providing expertise in territorial management. This includes the development of exploratory projects and case studies aimed at identifying best practices already in use in similar contexts. Additionally, training workshops will be organized for local technicians and administrators, focusing on environmental, social, and infrastructural issues. The planned tasks as part of the deliverable activities consist of

creating a toolkit or guidelines for managing inhabited environments, specifically designed for criticality monitoring in the regions of Intermediate Italy. This also encompasses the identification of best practices, enhancing the skills of seasoned technicians and administrators in territorial management, and developing policy briefs and guidelines intended to bolster the resilience of these territories and public spaces in the face of climate change. This approach ensures that these areas are better prepared to effectively support their populations.

Community Engagement and Dissemination. We strive to create spaces for dialogue among academics, local institutions, and civil society to encourage reflection on managing risks associated with landslides and floods. This includes fostering a sense of shared responsibility and utilizing cultural and educational tools as catalysts for change. By viewing the territory as a shared heritage, we aim to inspire actions that promote the dissemination of scientific knowledge, enhanced by artistic practices, to engage citizens both as observers and active participants. Furthermore, we seek to highlight the importance of healthy community spaces, aiding in the identification of changes that can lead to critical issues, and promoting collective practices to address these challenges. To raise awareness of both local and global risk factors, we will implement communication, awareness, and informational programs tailored for technicians, administrators, residents, tourists, and students. This initiative will involve establishing and activating operational tables among institutional stakeholders to engage them in securing the territory, as well as promoting activities such as photographic campaigns, traveling exhibitions, and seminars to effectively share the findings of our studies with the local community.

1.3.2 *The UNINA interpretation and experiences*

The methodology proposed by the UNINA group for developing MTPL aims to build incremental and multidisciplinary knowledge while formulating policies and strategic plans for the selected territories under study. This approach is adaptive and place-based, as it begins by identifying some constant methodological steps while allowing flexibility in choosing working methods, timelines, and research tools based on the specific characteristics of the territories, activated processes, ongoing projects, and the network of local actors involved. The experiments conducted and planned in the field and in the lab to investigate the territories are diverse, heterogeneous, and hybrid, reflecting the need to explore various aspects of territorial sustainability and to develop transcalar, integrated, and multi-objective design solutions. The proposed methodology identifies five potentially cyclical and recursive phases that enable an incremental knowledge process, structured to facilitate the intersection of different disciplines and the involvement of diverse local stakeholders actors.

The phases are as follows:

- 1) **Background:** The starting point is selecting the location where research activities will be conducted. This selection can be made in two ways: based on a general research theme, identifying places or systems of places that emblematically evoke a landscape, a type of territory, an ongoing process, or a project, or by selecting locations with specific preconditions that favor the development of proactive activities with different stakeholders to question or initiate projects.
- 2) **Common Ground:** This phase involves sharing knowledge and approaches and creating a collaborative and facilitated working environment. This environment brings together diverse and heterogeneous contributions, potentially involving research groups with different expertise and local actors relevant to the theme or territory under study. This phase includes moments of dialogue and coordination to identify areas for action and experimentation and to build the enabling conditions for supporting the decision-making problems.
- 3) **Landing:** This operational phase can be desk-based or fieldwork, depending on the case. During this phase, investigations on the selected theme and/or location use diverse participative and deliberative approaches, methodologies, and tools. The goal is to produce, manage, and share various outputs, each contributing differently to one or more objectives: 1) interpreting places and territorial processes; 2) collecting quantitative and qualitative data; 3) actively involving local actors and stakeholders; 4) activating and/or developing local processes; 5) identifying potential strategic actions; 6) drafting shared project visions. Activities can be condensed into a few days or spread over time, and they can take place in a single location or multiple contexts within the same territory.
- 4) **Interacting:** This phase serves as a crucial juncture in the proposed methodology. Similar to the "Common Ground" phase, it involves discussing and reflecting the generated outputs. This phase may raise different issues that could require: 1) returning to phase 1 ("Background") to reiterate the process by selecting other locations for further investigations; 2) returning to phase 2 ("Common Ground") to expand active involvement and gather new expertise and perspectives on the selected theme and location; 3) returning to phase 3 ("Landing") to specify and deepen aspects of the general theme. This concerted iteration, based on feedback and dialogue, allows the group to self-regulate the development of investigations and determine when it is necessary to proceed to the final phase, thus concluding the knowledge process, albeit temporarily.
- 5) **On-cloud:** The final phase focuses on consolidating the results from phases 3 and 4, adapted according to the specific form and context of the MTPL. The goal is to return the findings of the investigations, projects, and processes to the territory and the

network of local actors and stakeholders. This phase also includes activities for disseminating the multidisciplinary research conducted and sharing results for technological and cultural transfer. The results and outputs of the MTPL can provide valuable knowledge and development perspectives, enhancing the research products intended for the AMELIA platform.

The structured methodological approach enables in-depth exploration of various themes in various territories, with a particular focus on the involvement of stakeholder groups or local actors. It is crucial to acknowledge that a significant step toward enhanced territorial sustainability is gaining a comprehensive understanding of all aspects that contribute to its achievement. This includes a thorough assessment of the various risks that characterize a specific area of interest and raising awareness of these risks within the local community. The MTPL can serve as a valuable tool for a public communication campaign addressing the potential risks present in a specific territory, harnessing the synergy between science, institutions, and the community. Its goals are to raise awareness among individuals and communities exposed to particular risks and to encourage activities and behaviors aimed at preventing or minimizing their impact.

Simultaneously, the MTPL could provide a platform to share the extensive knowledge gained through the GRINS project regarding natural hazards in a specific territory. This would enhance awareness among local institutions responsible for territorial management and guide them toward more informed and effective policies.

The MTPL can represent an opportunity to promote the dissemination of best practices, concrete actions for risk and vulnerability reduction, and contribute to fostering a culture of civil protection and civic cooperation. It can also highlight the active role that different stakeholders can play in different risks prevention and reduction by adopting a proactive approach before a disaster occurs.

1.3.3 The Unibo interpretation and experiences

MTPL activities undertaken by UNIBO create a participatory environment where trust among stakeholders can be established, a shared vision for their territory can be defined, and meaningful solutions for the communities involved can be co-designed. Community and stakeholder involvement is crucial for undertaking inclusive and sustainable rural regeneration, resilience and growth, being able to generate additional benefits not just to the social capital, but also to the natural, built and human capitals of the territory (Egusquiza et al., 2020). Public participation in political and planning processes is quite common and crucial to engage key stakeholders and local communities in interpreting and realizing challenges, barriers and desires for their territory's sustainable and inclusive

growth. However, while participation is increasingly included in planning practice and legislation (Berman, 2017; Eiter and Lange, 2015; Hartley and Wood, 2005) especially in urban contexts, this approach seems quite limited in rural areas. This is probably due to the loss of local knowledge and disengagement (Johansen and Chandler, 2015) that has been occurring in rural contexts, as well as the geographic constraints and the difficulty to sustain the “communities of interest” over time (Osborne et al., 2010).

A second element of the MTPL is multi-territoriality, which can also be conceived in terms of territorial frameworks (e.g., human, natural, cultural, social, and economic), which have different geographies and intersect different territories. Therefore, working with rural communities means also considering wider or even fragmented contexts that are not aligned with administrative boundaries but are more linked to relationships and capitals that overcome physical borders.

Finally, the MTPL deals with policies, which should be created or even influenced by the participatory and multi-level and multidisciplinary process that is established.

UNIBO would consider the MTPL in inner areas under this perspective, which considers rural contexts as rural ecosystems made by different spheres. By capitalizing on past and current successful experiences (De Luca et al., 2021), we aim to establish a participatory environment in an inner area in the Abruzzo region, where an experience in line with the GRINS MTPL is taking place.

The proposed methodology includes some important stages inspired by a design-thinking approach. This approach has been adopted also in the planning sphere to encourage different stakeholders and target groups to work collaboratively and iteratively, with the aim of bridging the gap between policymakers and communities (Raynor, 2018). The stages are described below.

Getting Started: This stage is dedicated to starting a very first and preliminary interaction with key study subjects interested in creating solutions for their context. This phase is helpful to identify general issues and ambitions that are most relevant to the involved communities. These drivers are based on local capitals that can be exploited as well as key domains where major attention can be put.

Stakeholder Identification and Engagement: This stage focuses on brainstorming to identify key stakeholders based on predefined challenges and ambitions. It is fundamental to the success of the MTPL. This phase involves thorough mapping of all relevant stakeholders across various sectors, ensuring inclusivity and active participation. Particular attention should be given to achieving good coverage in terms of competencies and representativeness (i.e., including government entities, local businesses, community organizations, and individuals who represent marginalized or vulnerable groups), assessing their relevance and influence to identify the most important stakeholders. Once stakeholders have been identified, the next step is to involve them in collaborative activities

where they can share their ideas, express concerns, and assist in co-developing place-based solutions. This phase supports the following stages.

Identifying Vision and Challenges: This phase is dedicated to set up a common vision for the future of their territories among the stakeholders involved. Consequently, a more detailed analysis of the different territorial frameworks and geographies of stakeholders in the network can be mapped as well as the relevant policies that influence the study area, trying to downscale these analyses to assess specific gaps. This material will be useful for easing the discussion and better understanding the real needs.

Defining Possible Solutions: This phase is dedicated to identifying, tailoring and developing potential new solutions to tackle challenges and needs already identified. These solutions can come from best practices already in place in similar territories, as well as from calls to ideas and similar initiatives aiming to seek valuable and innovative solutions to inspire the local community.

Fine-tuning solutions: This phase is dedicated to select the solutions identified and making them tailored to and feasible for the local context. This implies the definition of roles and responsibilities and the allocation of funds.

Implementation: After selecting and fine-tuning the solutions, the community is ready to implement them.

This methodology ensures that local communities are at the center of the decision-making and co-development processes, ensuring their needs, aspirations, and challenges are addressed directly. However, the method should be applied with a good level of flexibility. Additionally, it should be tailored to the different situations according to the level of local stakeholders' engagement and external perturbations that can hamper the foreseen consequence of the stage.

2. Some initiatives of field and in-lab experiments

2.1 Introduction

Since the GRINS research activity began, the Politecnico di Milano has collaborated with various contexts in Northern Italy. Specifically, two preliminary on-field experiments were carried out. The first experiment focused on the area between the provinces of Ravenna and Ferrara, while the second examined the region encompassing the municipalities of Padua, Vicenza, Bassano del Grappa, and Castelfranco Veneto.

In the first case, the Politecnico di Milano conducted a preliminary study on the Po Delta area as part of a broader examination of European deltaic regions. This initiative was undertaken with the University of Paris-Val de Seine (ENSAPVS), the TVK office, and the Museum National d'Histoire Naturelle de Paris (MNHN). River mouths are particularly vulnerable to the risks of submergence and continental flooding, primarily due to their flat and shallow topography, shaped over centuries by sedimentation from river waters. In these areas, one can find diverse natural features, including lagoons, wetlands, and reserves, alongside significant infrastructure such as canals, reclamation projects, and mobility systems. These regions serve as vital biodiversity reserves, housing marshy areas and protected habitats, while also acting as hubs for human activity characterized by extensive coastal settlements and intricate networks of canals and reclamation efforts. Collaborative discourse with other research institutions has explored critical issues, including the impacts of subsidence and the Italian context's vulnerability to extreme climate events, such as prolonged droughts or significant flooding occurrences.

In the second case, the research group from the Politecnico di Milano, in collaboration with the G. E. Ghirardi Onlus Foundation and under the patronage of the Veneto Region, the Province of Padua, and the City of Piazzola sul Brenta, organized a conference to share the research findings and engage with local stakeholders. The event featured discussions followed by a final round table, bringing together scholars, local administrators, and citizens to explore themes related to territorial changes, emerging challenges, ongoing projects, and governance perspectives for the dynamic territories of Italian provinces. This dialogue illustrated the concept of a territory-laboratory, where urban and rural areas coexist in ever-evolving forms, serving as an innovative space for managing transformations in life, labor, environment, production, settlement patterns, and society. Like many other Italian

provinces, the area under examination is a dynamic and vibrant intermediate territory, often characterized by self-initiated and innovative efforts. This includes collaboration among entities and institutions, business development, and organizing services and daily life spaces for citizens, despite its peripheral position within the broader framework of national policies and funding to support local public entities.

These two field experiments established the foundation for identifying two case studies to continue the research in the third year: a territorial section along the Serio River, stretching from Clusone to Crema, and Lake Orta, located between the provinces of Novara and Verbano-Cusio-Ossola. Water plays a vital role in shaping the territorial landscape in both contexts. The riverine setting provides the advantage of encompassing multiple geographic contexts, and since it is a case study situated in Lombardy, it helps strengthen the relationship between the Politecnico di Milano and the region it represents. However, it presents the challenge of being a vast area that has yet to be explored in depth, despite the extensive existing literature. In contrast, the lacustrine context is highly focused and presents numerous issues to explore; yet it is a more limited field, confining reflection largely to specific aspects of Middle Italy. The presentation of these two cases does not necessarily imply a commitment to pursue both. The research team maintains the flexibility to decide during the process whether to focus on one or both contexts, evaluating which should take precedence (Figure 6).

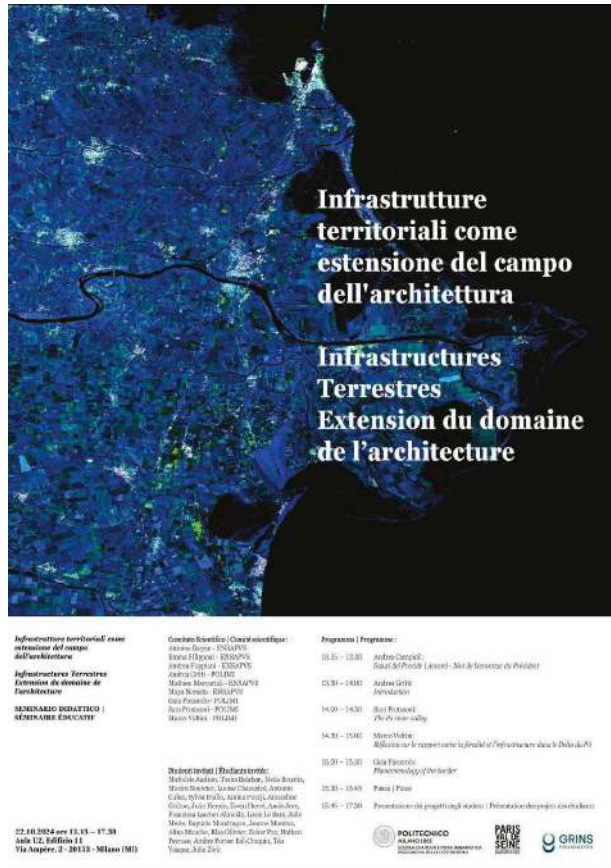


Figure 6: Left: Poster of the educational seminar held in collaboration with the University of Paris-Val de Seine (ENSAPVS). Right: Poster of the event “Middle Italy: services, infrastructure, heritage and production” held in Piazzola sul Brenta on June 26, 2024.

The research units at UNINA and UNIBO focus on territories that are mainly recognisable as inner areas. The challenges and ongoing projects that characterise the territories of Inner Italy, where structural problems such as demographic decline, geographical and economic isolation, and institutional and stakeholder fragmentation continue to limit development possibilities, are the subject of interest for the Multidisciplinary Territorial Policy Lab (MTPL). These territories, often lacking the assets to enhance their resources, collaborative networks and strategic planning visions, can find in MTPL new tools to coordinate interventions, enhance material and immaterial heritage, systematising non-related projects and generate prospects for sustainable territorial development. Several ways to read this territorial dimension offer different and complementary perspectives on the possibilities of intervention in these places. On one hand, the National Strategy for Inner Areas (SNAI) operates with a clear classification, subdividing municipalities according to specific criteria and investing in targeted projects on clearly distinct areas, without considering the possible relations with the surrounding territorial

areas. On the other hand, the GRINS taxonomy proposes a more integrated view, taking into account fringe areas, municipalities located on the margins between the Intermediate Italy and the Inner Italy. These territories – identified by the border class ‘sparsely populated urban-rural continuum of mountainous/inland hills’ – can participate in the definition of territorial strategies aimed at an inter-systemic collaboration between different territorial areas and trigger virtuous development processes.

Belonging to this dimension are the case studies chosen to explore the impact in terms of processes and projects that the Multidisciplinary Territorial Policy Lab can generate in Inner Italy belong to this dimension: Irpinia, with Apice and Grottaminarda, Atena Lucana in the Vallo di Diano, Sant'Eusanio Forconese among the municipalities of the Cratere of Aquila, and the municipalities involved in Borghi IN Network in Abruzzo. The selected case studies are united by the existence of different projects that focus on issues related to sustainable development, infrastructure, and the re-inhabitation of these territories while living with the risks. Thanks to the SNAI 2021-2027 planning and the NextGenerationEU and NRRP investments, the present initiatives not only involve economic resources, operational tools, new infrastructures and modifications to the urban and rural fabric, but also represent an opportunity to restore centrality to marginalised contexts and trigger processes of territorial regeneration. But triggering is not enough: it is necessary to transform these initiatives into opportunities for structural change and integration between the actors and territories involved. MTPLs intend to work in this direction, in contexts in which they are carried out, enhancing the cultural, social and economic peculiarities of each territory. This rooting process transforms projects into concrete tools for growth, not only in economic terms, but also in social and cultural terms.

Despite being the focus of reflections on their unexpressed potential, municipalities still suffer from a fragmented political condition and from the absence of a systemic vision that allows them to make the most of natural, cultural and productive resources, as well as economic ones. This fragmentation has amplified inequalities and made it difficult to compete with territorial dimensions that have more infrastructure and services, as well as more structured governance. In a fragmented context, such as that of Inner Italy, where individual municipal administrations and stakeholders in the territory struggle to build a unified vision, MTPLs offer a space to elaborate strategies that go beyond mere administrative borders, extending to a broader territorial dimension concerted towards the identification of a common purpose.

In this scenario, the Multidisciplinary Territorial Policy Labs can play a fundamental role: they are not only spaces for experimentation and planning, but real tools to root ongoing projects in local contexts, integrating them. In this way, projects and actions can become concrete opportunities to build the territorial sustainability of these marginal areas.

2.2 The Serio River between human and natural geographies

The Po Valley is a densely populated geographic region surrounded by the Alps, the Apennines, and the Adriatic Sea. Flanking the Po River to the north and south are two tectonic lineaments, the Insubric and the Sub-Apennine, which are oriented like the sides of a triangulation that outlines the Emilian coastline, stretching between the Venetian lagoon and the coastline of the Emilia-Romagna region.

Urbanization has evolved in increasingly tumultuous ways along the peripheries of this floodplain, thereby creating ample space in the center for movement and the establishment of various service functions. Logistics, alongside intensive agriculture and animal husbandry, has significantly contributed to the gradual degradation of the ecological and environmental balance in Italy's largest floodplain. This decline is reflected in recurring air pollution alerts and frequent flooding, the most recent instance occurring in Emilia-Romagna during the spring of 2023. Viewed from the region's waterways, the Po Valley presents a lush and fragile landscape. The watersheds of the right-hand tributaries of the Po cover a smaller area of this flat terrain than those on the left, which collect water from the pre-Alpine lakes. On either side, the last major tributaries of the river are the Mincio and Panaro. At the same time, the Adige and Reno flow directly into the Adriatic Sea after passing through the metropolitan areas and infrastructure hubs of Verona and Bologna.

Italy's primary communication routes have been successfully integrated despite the region's challenging topographical and hydrographical conditions. Highways and railways now connect the cities of Milan, Verona, and Modena, linking the linear conurbations of the Piedmont region with the scattered settlements throughout the plains. This transportation network reflects the area's original triangular layout.

The Po Valley presents a significant geographic advantage that local economies and urban communities have strategically utilized to promote their development. The extensive landscapes, organized around established settlement systems, become apparent when traversing the plains along the various routes linking the key nodes of the Via Emilia and the Milan-Venice corridor.

From this perspective, the Serio River exemplifies an intriguing case study. Flowing through a diverse range of landscapes, this riverine route provides a unique opportunity to explore the varied geographies of Intermediate Italy, which encompass surrounding mountainous regions, metropolitan conurbations, and small lowland towns. Furthermore, this area is significantly influenced by a major European infrastructure corridor, Corridor 3, which stretches from the Ural Mountains to the Strait of Gibraltar. This underscores the importance of researching this riverine region, as it facilitates engagement with pressing issues currently impacting European territories (Figure 7).

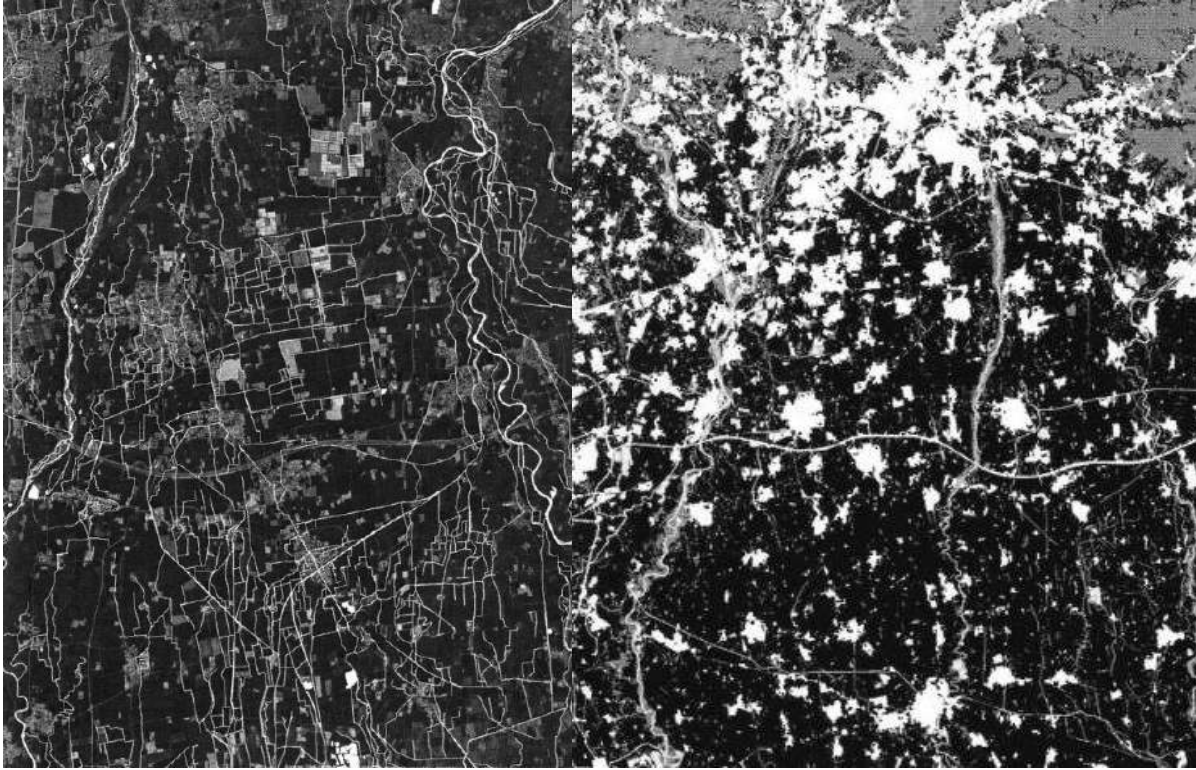


Figure 7: Left Waters and open spaces between the Serio and Oglio rivers. Right Open spaces of the extended metropolis between Milan, Bergamo, Brescia and Crema. Images from the article: Ali, A. and Lanzani, A. (2021) 'In the peri-urban space of the extended metropolis: plan and projects for Romano di Lombardia', *TERRITORY*, (93), pp. 37–43. Available at: <https://doi.org/10.3280/TR2020-093006>.

2.2.1. Territories and specific areas

The Serio River is a 124-kilometer watercourse located in Lombardy. It is the main tributary of the Adda river which the Serio serves on the left side. It originates from Mount Torena in the Orobian Alps and provides water to the Barbellino reservoirs. The river initially flows south southwesterly, then shifts to the south at Alzano Lombardo, ultimately joining the Adda near Bocca di Serio. Geographically, the river can be divided into three segments: the Seriana Valley, stretching from its source to Alzano Lombardo; the Bergamo stretch, from Alzano Lombardo to Mozzanica, characterized by a broad gravel bed; and the Crema stretch, extending from Mozzanica to the Adda.

Various forms of urbanization can be observed along the river shaft. In the Seriana Valley, urban development primarily occupies the valley floor, resulting in a largely linear arrangement that is sparser near the source of the river and becomes increasingly dense as it progresses southward. The distance between the river and surrounding structures is notably minimal in this area. In the northern section close to Bergamo, urbanized spaces exhibit a more reticular layout, characterized by larger interspersed open spaces. The river runs close to and sometimes intersects with significant national infrastructure, including Orio al Serio Airport, the A4 highway, and the Milan–Venice railway. South of the airport, the

settlements are detached and more concentrated around focal points (i.e., the historical city centers).

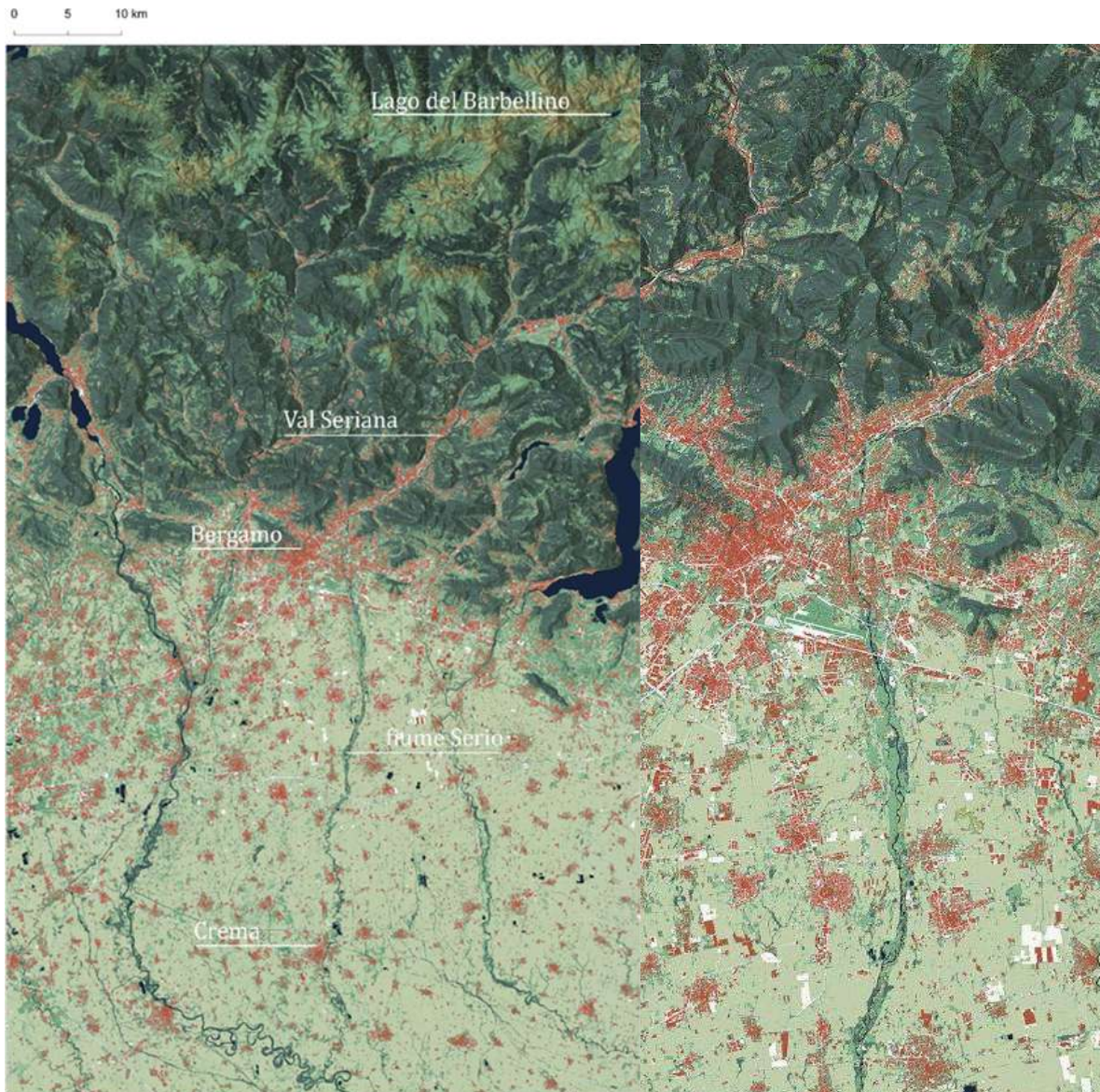


Figure 8: The map shows the path of the Serio River from Lake Barbellino to its junction with the Adda River, just past the city of Crema.

The examined area faces several mobility challenges (Figure 8). Although the Seriana Valley benefits from an innovative local public transportation system, it needs more coordinated transportation strategies. This leads to an excessive catchment area and a public transport system that often requires passengers to change vehicles multiple times. In the lowlands, the transportation landscape is marked by the Brebemi highway, which experiences low traffic volumes, in contrast to the overcrowded A4 highway. Furthermore, public rail transport primarily operates in an east-west direction, while the north-south connections are notably lacking, exacerbating mobility issues along the river corridor.

Ecological and environmental challenges compound these issues. The Serio River, particularly in the stretch that flows through Mozzanica, is in a deteriorating environmental state. This decline is primarily attributed to PFOS, a sub-type of chemical classified as PFAS, known for being a persistent pollutant. Furthermore, the water quality has worsened due to AMPA, a degradation product of glyphosate, an herbicide widely used globally and in Italy. The situation of the Serio River reflects a broader trend in northern Italy, as it runs through a densely populated and industrialized region. Over the past century, the river has been utilized for hydroelectric power generation, agriculture, and industrial purposes. However, these activities have resulted in significant water pollution, altering its quality and temperature. Additionally, there have been instances of deliberate pollution, which continue to pose a problem.

These issues, combined with a diverse social fabric, a dense cultural and educational network, and close synergy between local libraries and educational institutions, make this a great research interest (Figure 9).

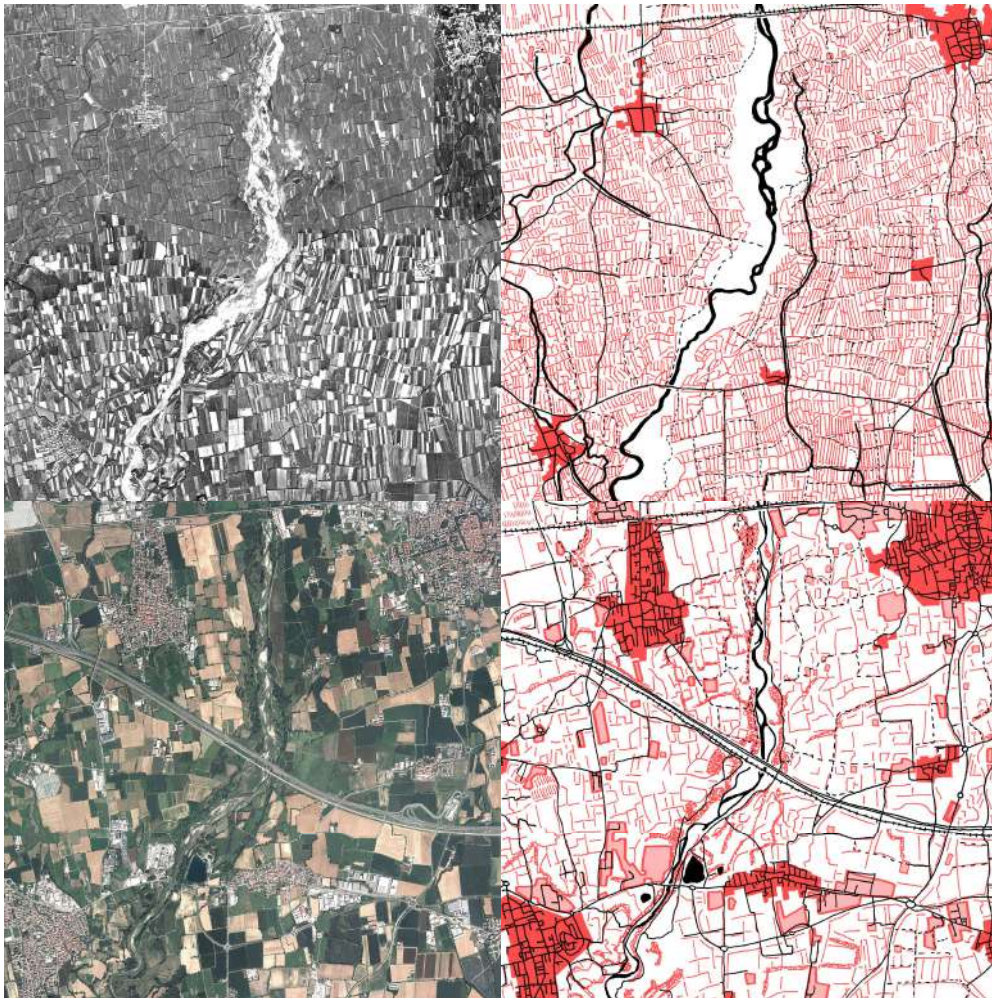


Figure 9: The territory between Romano di Lombardia and Mozzanica, near the Serio River. Above, the territory in 1954. Bottom, the territory in 2023.

2.2.2 Context and stakeholders

Currently, potential stakeholders have been identified, including representatives from public agencies, private organizations, trade associations, and other relevant parties. The next step is to establish more formal communications to assess their interest and willingness to participate in the multidisciplinary workshop actively. Only after this phase it is possible to compile the official list of stakeholders. The entities selected at this stage include:

- The municipalities of Bergamo, Alzano Lombardo, Seriate, and Romano di Lombardia, with which the members of the Milan research group established various contacts before and during the GRINS research.
- The municipal unions "Unione dei Comuni della Presolana", "Unione Comunale dei Colli" and "Unione dei Comuni Lombardia dei Fontanili" are valuable entities for addressing complex territorial demands and needs that extend beyond the simple administrative boundaries of individual local authorities.
- The Serio Regional Park, a local territorial entity managing a vast protected regional area. Its board includes the municipalities of Bariano, Calcinate, Casale Cremasco, Castel Gabbiano, Cavernago, Cologno al Serio, Covo, Crema, Fara Olivana con Sola, Forno S. Giovanni, Ghisalba, Grassobbio, Madignano, Martinengo, Montodine, Morengo, Mozzanica, Pedrengo, Pianengo, Ricengo, Ripalta Arpina, Ripalta Cremasca, Ripalta Guerina, Romano di Lombardia, Serignano, Seriate, Urgnano, Zanica, and the provinces of Bergamo and Cremona.
- The Rete Bibliotecaria Bergamasca (RBBG), a provincial library network aimed at expanding the cultural offerings throughout the provincial territory through the interlibrary loan system. It includes 245 public libraries and 6 Sistemi Bibliotecari (S.B.): S.B. Area di Dalmine; S.B. Valle Seriana, S.B. Area Nord Ovest; S.B. Seriate Laghi; S.B. Bassa Pianura bergamasca; S.B. Urbano di Bergamo.
- Bergamo Trasporti, the portal of the three consortium companies (BERGAMO TRASPORTI EST scarl; BERGAMO TRASPORTI OVEST scarl; BERGAMO TRASPORTI SUD scarl) managing the local public transport service throughout the province.
- The Fondazione della Comunità Bergamasca, established in 2000, aims to improve the quality of life for the inhabitants of the province of Bergamo by promoting social solidarity, cultural development, and the strengthening of the social capital of the territory, with a focus on comprehensive support for even the most marginalized communities in the province.
- The "Consorzio di Bonifica della Media Pianura Bergamasca", a public entity established in 1955, manages and protects water drainage, soil defense, safeguarding water and natural resources, irrigation, and enhancing a designated reclamation area.
- The cultural entities "Arte, Lavoro, Territorio (ALT) - Museo collezione Tullio Leggeri" and the "Associazione Seriatese Arti Visive (ASAV)".
- The "Biblioteca Civica Angelo Mai e Archivi storici," opened in the late 18th century and always managed by the Municipality of Bergamo, which owns it, is one of the richest historical preservation libraries in Italy and offers opportunities for historical research in all disciplinary fields.

- The “Fondazione Dalmine ETS,” established by “TenarisDalmine” to promote industrial culture by highlighting the history of a steel company rooted in the territory, promotes studies and research in the fields of business history and economic and social history, disseminates the results through exhibitions and events, and organizes seminars and training sessions.
- The “SIAD Fondazione Sestini,” a foundation to organize cultural events, support the medical-scientific community, publish study and technical-scientific dissemination materials, and create scholarships.
- The “Fondazione Bergamo nella Storia” was born from a strong interaction between public institutions and private entities, united by the goal of protecting, enhancing, and promoting the “Museo delle storie di Bergamo” network and its heritage.
- The association “Legambiente Lombardia”.
- The “Consorzio di Bonifica Dugali - Naviglio - Adda Serio” formed from the merger of three districts: “Dugali”, “Naviglio-Vacchelli”, where the respective reclamation consortia conducted their reclamation and irrigation activities over a total area of approximately 110,000 hectares, and Adda-Serio, in the Crema area, where the “Consorzio di Miglioramento Fondiario di Il grado” operated over an additional 55,000 hectares.

Entity/association/organization name	Domain	Expertise
Comune di Bergamo	Policy	Transversal
Comune di Alzano Lombardo	Policy	Transversal
Comune di Seriate	Policy	Transversal
Comune di Romano di Lombardia	Policy	Transversal
Unione dei Comuni della Presolana	Policy	Transversal
Unione Comunale dei Colli	Policy	Transversal
Unione dei Comuni Lombarda dei Fontanili	Policy	Transversal
Provincia di Bergamo	Policy	Transversal
Provincia di Cremona	Policy	Transversal
Parco Regionale del Serio	Public/user	Sustainable agrifood systems and ecosystem management
Rete Bibliotecaria Bergamasca (RBBG)	Public/user	Culture and cultural innovation
BERGAMO TRASPORTI EST scarl	Industry/services/investors	Local services
BERGAMO TRASPORTI OVEST scarl	Industry/services/investors	Local services
BERGAMO TRASPORTI SUD scarl	Industry/services/investors	Local services
Fondazione della Comunità Bergamasca	Public/user	Transversal
Consorzio di Bonifica della Media Pianura Bergamasca	Industry/services/investors	Sustainable agrifood systems and ecosystem management
Arte, Lavoro, Territorio (ALT) - Museo collezione Tullio Leggeri	Public/user	Culture and cultural innovation
Associazione Seriatese Arti Visive (ASAV)	Public/user	Culture and cultural innovation
Biblioteca Civica Angelo Mai e Archivi storici	Public/user	Culture and cultural innovation
Fondazione Dalmine ETS	Industry/services/investors	Culture and cultural innovation
SIAD Fondazione Sestini	Industry/services/investors	Culture and cultural innovation
Fondazione Bergamo nella storia	Public/user	Culture and cultural innovation
Legambiente Lombardia	Public/user	Sustainable agrifood systems and ecosystem management
Consorzio di Bonifica Dugali - Naviglio - Adda Serio	Public/user	Sustainable agrifood systems and ecosystem management

Table 1: Stakeholder Map

2.1.3 Methodologies and actions

The research works on the study of four key areas. The first area delves into the significance

of building heritage and social dynamics. Property values in the region under study show considerable variation from town to town, though not as extreme as those observed in Milan. Access to housing is uneven, which raises important reflections on both potential opportunities and critical challenges, ultimately guiding the development of a public action strategy. The initial phase will involve mapping demographic trends and their influence on building heritage values to better understand the geography of wealth and poverty.

The second research area focuses on the demand for mobility and the availability of local public transport services, both of which are vital components of community welfare. Currently, the region demonstrates significant potential along with notable challenges. An integrated and comprehensive transportation policy is essential for enhancing the population's resilience and promoting wealth redistribution throughout the area.

The third area focuses on everyday infrastructures, which are the public and communal spaces that underpin community life in urban centers. The support provided by schools, libraries, gyms, assisted living facilities, medical centers, cultural venues, and community organizations highlights the vitality of these areas and fosters a network of solidarity and mutual assistance, thereby spreading urban and metropolitan values across a larger context. Bolstering this network of public and communal spaces is essential for the resilience of these territories.

The third area emphasizes everyday infrastructures, encompassing the public and communal spaces essential to community life in urban centers. The support offered by schools, libraries, gyms, assisted living facilities, medical centers, cultural venues, and community organizations underscores the vitality of these areas and promotes a network of solidarity and mutual assistance, thereby disseminating urban and metropolitan values on a broader scale. Strengthening this network of public and communal spaces is vital for the resilience of these neighborhoods.

Finally, the fourth area concerns the ecological transition, which is seen as increasing energy production from renewable sources and strengthening ecological and environmental infrastructure. This area must confront land use, particularly in the intensive agricultural contexts of the mid- and lowlands, where the most crucial environmental and energy challenges are played out.

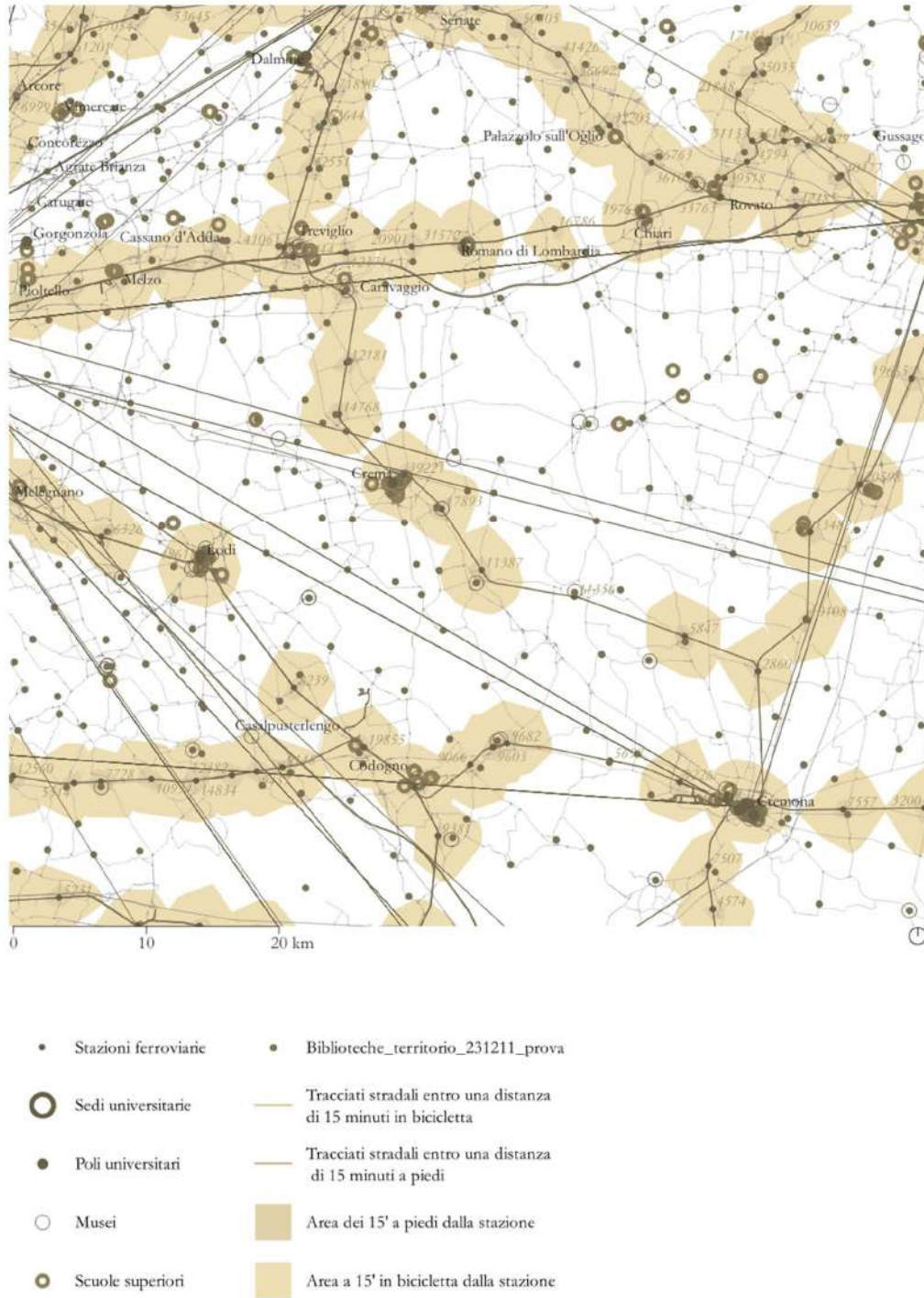


Figure 4: Proximity of the educational and cultural infrastructures to the railway stations

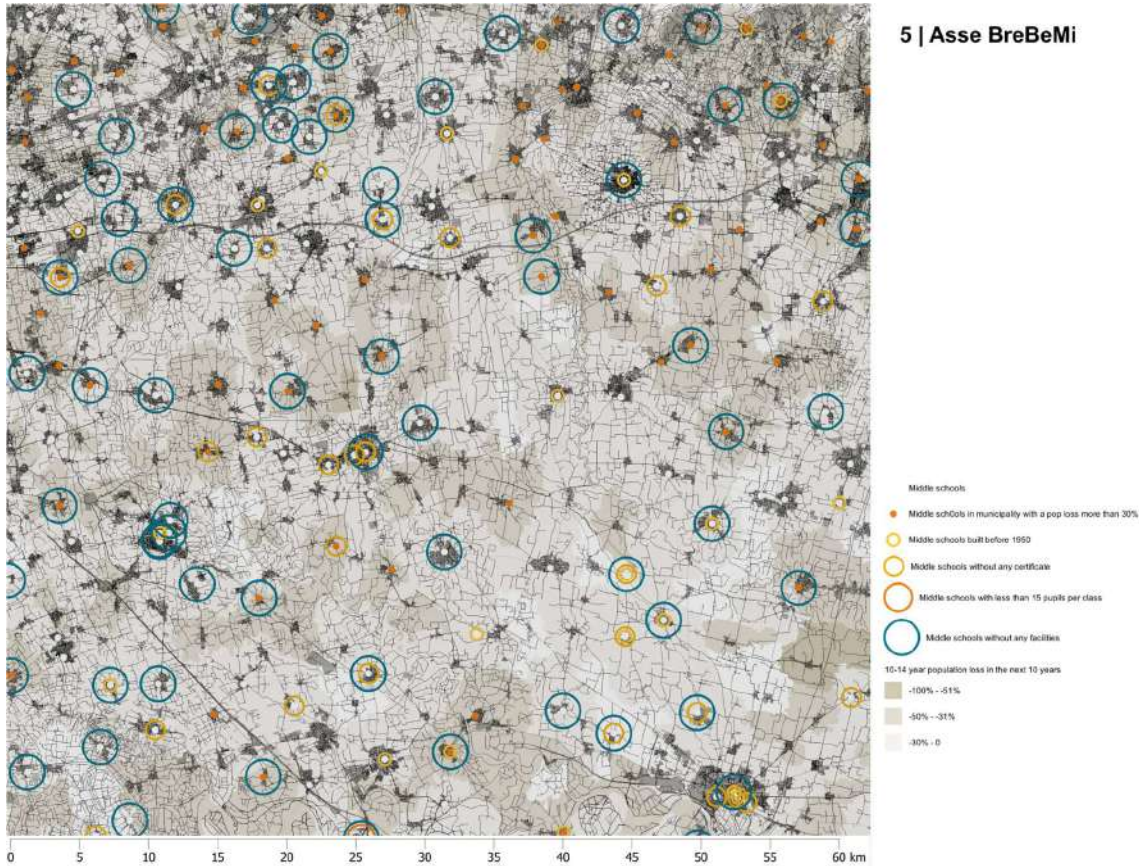


Figure 5: Distribution of schools at risk of closure.

2.1.4 Aims and impacts towards design of area-specific strategies for gap/vulnerability reduction and equalization policies

One of the primary expected impacts is disseminating knowledge to increase awareness among residents. We plan to organize public meetings involving citizens and local stakeholders to achieve this goal. Enhancing and sharing knowledge about the Serio River and its vulnerabilities will foster a sense of responsibility among residents for the stewardship of both natural and developed spaces. This heightened awareness is crucial for the long-term conservation of the area. By showcasing the accessibility of high-level research to the public, we aim to engage citizens as integral participants in a broader initiative, thereby enhancing community involvement and support. This increased awareness and sense of responsibility will naturally lead to community-driven monitoring efforts. Such initiatives will play a vital role in the ongoing protection and maintenance of the Serio River, while also supporting everyday infrastructure, ultimately empowering residents by actively involving them in the process of enriching both tangible and intangible heritage.

This research aims to enrich and enhance the interactive collaboration between political authorities and intermediary organizations. A certain degree of mutual involvement is already in place, and it has the potential to be further developed in the coming years,

especially considering that the river resource extends well beyond the confines of its water body. Our objective is to make the river area more inclusive by encouraging the participation of additional entities, thereby ensuring a holistic approach to managing the river and its surrounding environment. We envision this initiative as the foundation for future planning projects and tools, acknowledging that natural dynamics and social infrastructures can serve as catalysts for improving both public spaces and the quality of life for residents.

In summary, the expected overall impacts include: a) promoting broader and more cohesive planning efforts than currently exist; b) establishing a coherent, logical framework to guide urban planning actions in the forthcoming decades, recognizing that these will involve multiple entities with varying interests; and c) laying the groundwork for a systemic study of the relationship between soil, water, and settlements across a wider geographical area, defined not by administrative boundaries but by natural and settlement dynamics (Figure 10).



Figure 10: Multiple strategies will be pursued to disseminate knowledge and awareness among the inhabitants, including public meetings and a public exhibition. The photos shown here are from the exhibition 'Mi-Bg. 49 km seen from the highway,' curated by Andrea Gritti, Paolo Mestriner, and Davide Pagliarini; research group Elena Fontanella, Alisia Tognon, Marco Voltini, and Claudia Zanda; photographs by Giovanni Hänninen.

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2.3 Il lago d'Orta e la forma di una città-lago

In northern Italy, medium and medium-to-large lakes are often inhabited, forming complex life complexes extending beyond municipal and provincial boundaries. These lakes define “metro-montane-lacual” relationships of great interest. These territories are intermediate between urban and rural areas, forming a significant part of Italy's urban structure. This polycentric settlement pattern consists of interconnected small and medium-small centers. The complex relationships between ecologies, economies, and societies in these contexts require more articulated interpretation and governance tools that can address the plurality of contexts. These interconnected lakes and surrounding communities form a dynamic and intricate network that requires a nuanced approach to land management and protection practices, ensuring sustainable development and resilience against environmental hazards. In particular, this will involve studying the phenomenon of lake flooding due to landslides, a particularly significant phenomenon in the Italian alpine and pre-alpine contexts. The presence of natural lakes and reservoirs of different sizes deeply structures these territories' climatic, ecological, and settlement characteristics. These lakes are quantitatively significant and are crucial in shaping the landscape and influencing local economies and communities. This region's intricate network of lakes contributes to the unique environmental and socioeconomic fabric, supporting diverse ecosystems and providing essential resources for agriculture, tourism, and local industries. In addition, the lakes serve as vital hubs for recreational activities and cultural heritage, further entrenching themselves in the daily lives and identities of the surrounding populations. Understanding the dynamics of lake flooding in this context is essential to developing effective risk management strategies that protect the natural environment and the human communities that depend on it.

The focus will be on Lake Orta, a lake area already affected by landslides, mainly located in the municipality of Nonio. The main problem of these catastrophic events does not directly concern the inhabitants as much as the abnormal wave motion generated by a potential large landslide, which would put the inhabitants and settlements bordering the shores of the lake at risk. Despite the problem's urgency, the topic still needs to be researched. This research aims to fill this gap by providing an in-depth understanding of the risk dynamics and developing effective management strategies to protect local communities and the environment.

We expect to obtain the following results: An estimate of the consequences of climate change on Lake Orta and their economic and environmental impacts, documented through technical reports, financial assessments, and weather-climate scenarios; an analysis of the hazard of the disaster event and the risk that it may cause damage to property, environments, and people, presented through digital maps and models; a shared strategy among local public and private stakeholders for managing the disaster from an environmental, urban planning and health perspective and the actions to be taken to increase the resilience of public infrastructure; an enhancement of local knowledge of the area through the active involvement of citizens and local stakeholders; dissemination of results through activities that can attract visitors from other locations as well (Figure 11).

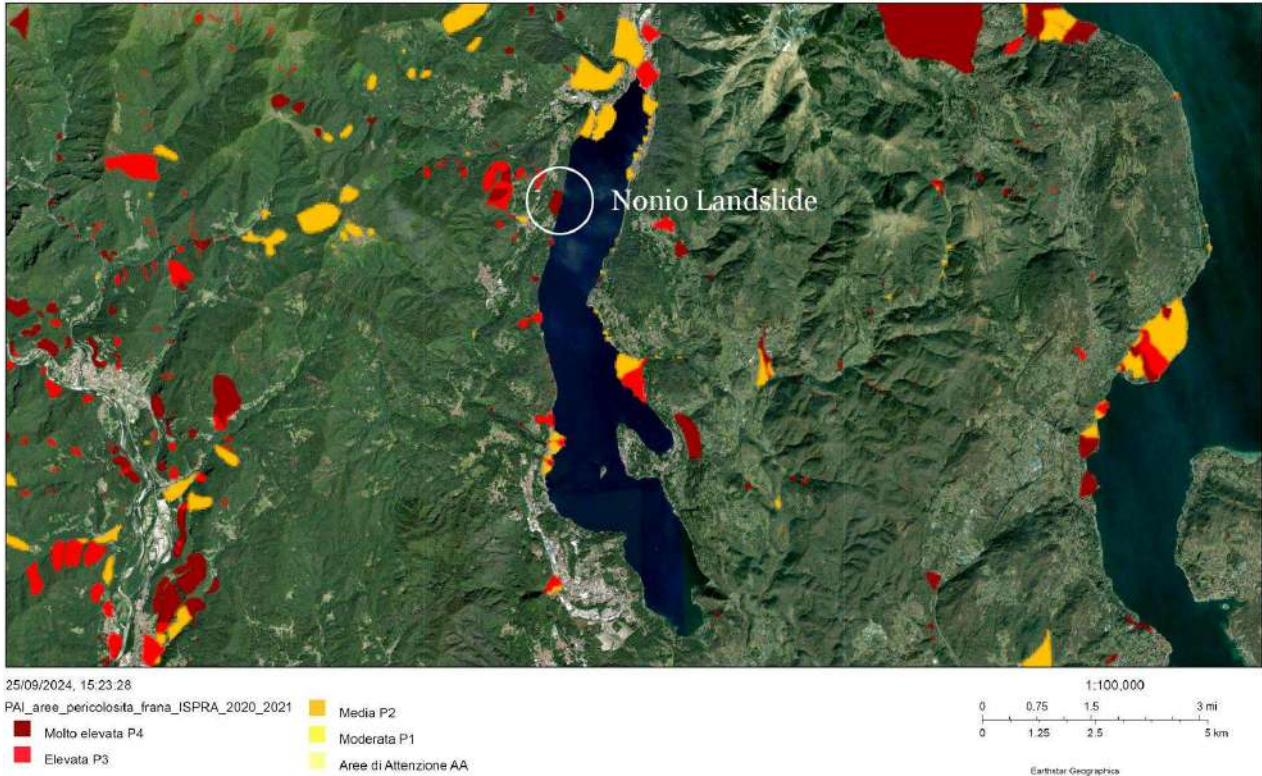


Figure 11: The image shows the location of the Nonio landslide slope. Although the population is not directly at risk, a potential landslide could generate a flood phenomenon capable of negatively impacting a large part of the shores of Lake Orta (source <https://sinacloud.isprambiente.it/>)

2.3.1 Territories and specific areas

Orta Lake's territory as a series of overlapping terraces surrounding the lake, encompassing various municipal territories. Because of its natural formation, the lake is surrounded by hills or steep slopes, with some flat areas of the shoreline where lake settlements are concentrated. The outflow, the Nigoglia Canal, lies to the north and flows through the entire city of Omegna, eventually flowing into the Strona stream. The Strona flows down through the Corciera valley to its confluence with the Toce River, which then discharges its waters into Lake Maggiore through the Fondotoce Plain. Omegna is the capital of Cusio, with just under 15,000 inhabitants. The entire Corciera valley, as far as Gravellona Toce is densely urbanized and is home to numerous industrial activities. The Fondotoce Plain is characterized by industrial activities, large-scale retail businesses, and tourist facilities, particularly campgrounds. The slopes of Lake Orta are at risk of landslides. In particular, the municipality of Nonio is affected by landslide phenomena, the most recent of which is a small landslide between January and February 2024. Our focus will not be so much on the landslide, which has a limited impact on inhabited areas, but rather on the flooding phenomenon it may generate. This phenomenon is of greater concern as it may affect many inhabited areas beyond Nonio.

Lake municipalities have varying percentages of urbanized land along the shores. There is

also a diverse presence of residential, productive, and tourist accommodation areas. In this regard, it is important to note the presence of thousands of Italian and foreign tourists during the summer, mainly in hotels and campsites along the lake (particularly in Orta San Giulio and Pettenasco). This influx of tourists significantly increases population density and the potential impact of any flood events, making it essential to consider these factors in risk management and emergency planning. Different land use and seasonal population fluctuations add complexity to the already daunting task of managing flood risks in these areas, making a comprehensive and adaptive approach necessary to ensure the safety and resilience of both permanent residents and temporary visitors. It is also important to consider that the area has a considerable artistic heritage that can suffer direct damage from flood risk or indirect damage because its accessibility can be compromised by the damage that floods can cause to both people and infrastructure. This heritage includes essential sites such as the Island of San Giulio with its Basilica and Benedictine Monastery, Orta with its medieval historic center, and numerous Romanesque churches on both sides of the lake. In addition, it should be noted that there is a certain vibrancy along the lakeshore. In Omegna, in particular, major events such as the San Vito festival with fireworks attract tens of thousands of people. The presence of such cultural and social activities underscores the need for comprehensive risk management strategies that protect not only the physical heritage but also the social and cultural fabric of the community (Figures 12 and 13).

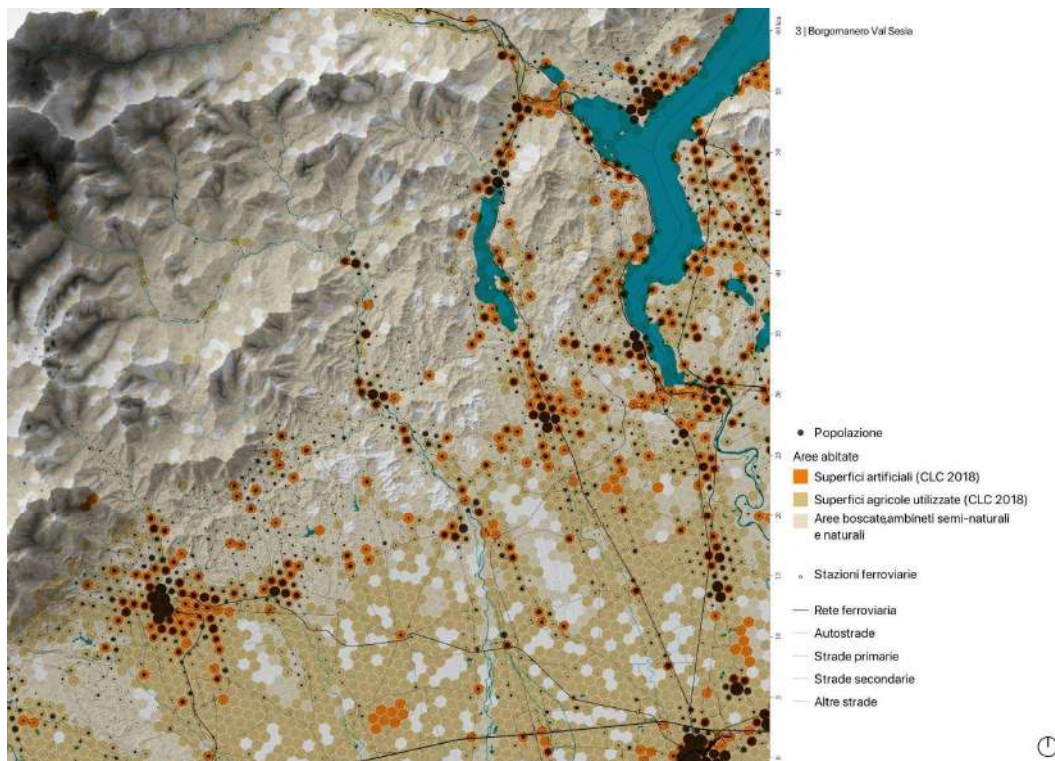


Figure 12: Artificial, Agricultural, and Forested Surfaces



Figure 13: The City-Lake Orta and the system of towns and small villages around Mottarone.

2.3.2 Context and stakeholders

The working group takes an integrated approach to address issues in the Lake Orta area. An interdisciplinary dialogue between key disciplines such as civil and environmental engineering, hydraulics, geotechnics, and hydrology (POLIMI - DICA and DEIB); architecture, urban planning, landscape planning and design (POLIMI - DASTU); climatology; economics (UPO - DISSTE); and translational medicine (UPO - DMET) is planned to be activated.

In addition, the following local stakeholders were identified among the potential stakeholders:

- the municipalities that signed the Lake Contract: Bolzano Novarese, Borgomanero, Briga Novarese, Casale Corte Cerro, Cesara, Gozzano, Gravellona Toce, Madonna del Sasso, Miasino, Nonio, Pettenasco, San Maurizio d'Opaglio, Soriso, Orta, Omegna
- the Lake Orta and Mottarone Ecomuseum Association
- the Province of Novara
- the Dragolago Association, the Mastronauta Association the Fantasy Park - Gianni Rodari
- the sports associations Associazione Canottieri Lago d'Orta Rowing Association, Circolo Vela Orta—Associazione Sportiva Dilettantistica, and the "Dive Project" association.

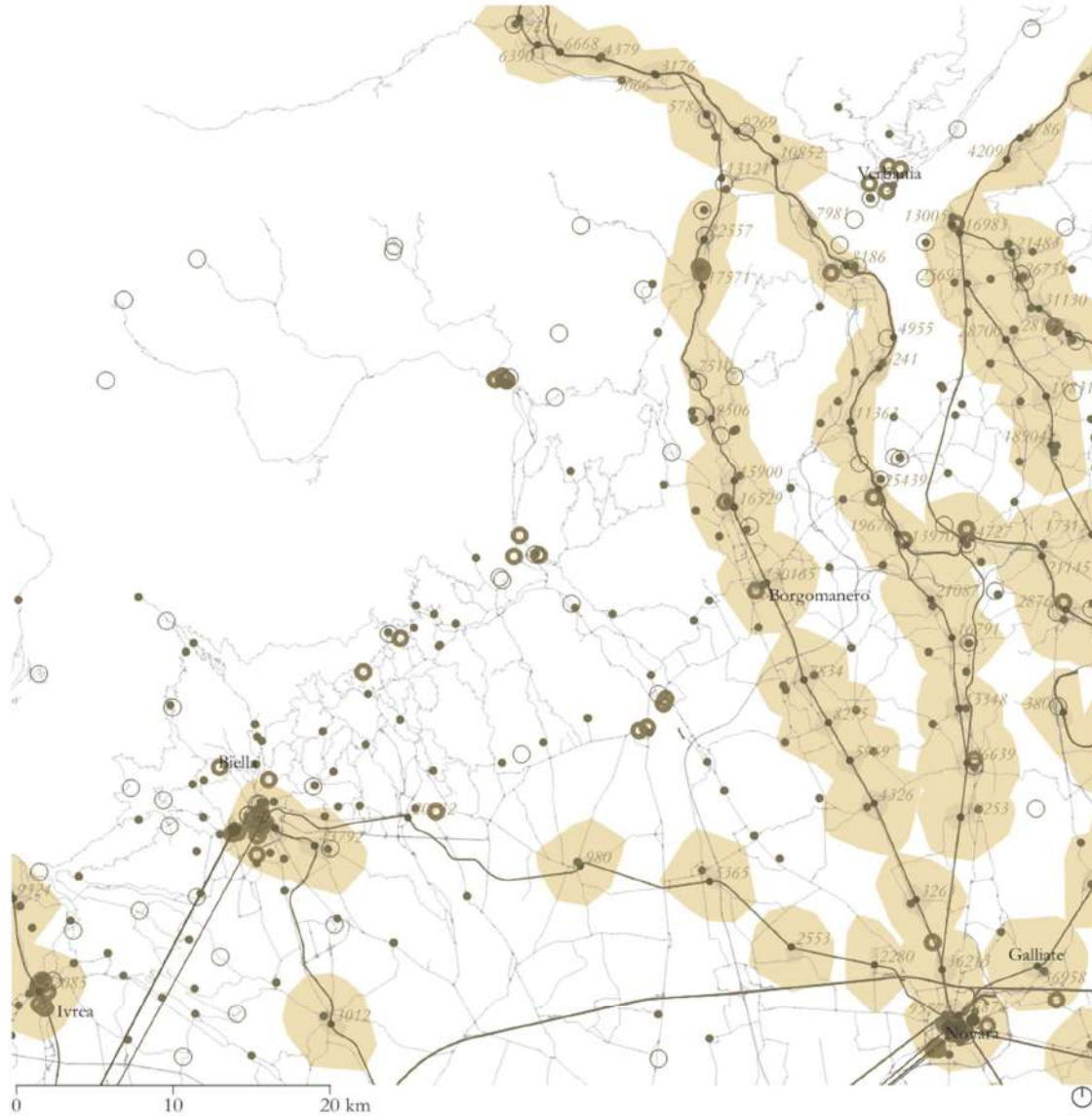
Entity/association/ organization name	Domain	Expertise
Comune di Bolzano Novarese	Policy	Transversal
Comune di Borgomanero	Policy	Transversal
Comune di Briga Novarese	Policy	Transversal
Comune di Casale Corte Cerro	Policy	Transversal
Comune di Cesara	Policy	Transversal
Comune di Gozzano	Policy	Transversal
Comune di Gravellona Toce	Policy	Transversal
Comune di Madonna del Sasso,	Policy	Transversal
Comune di Miasino,	Policy	Transversal
Comune di Nonio,	Policy	Transversal
Comune di Pettenasco,	Policy	Transversal
Comune di San Maurizio d'Opaglio,	Policy	Transversal
Comune di Soriso,	Policy	Transversal
Comune di Orta	Policy	Transversal
Comune di Omegna	Policy	Transversal
Associazione Ecomuseo del lago d'Orta e Mottarone	Public/user	Sustainable agrifood systems and ecosystem management
Provincia di Novara	Policy	Transversal
Associazione Dragolago	Public/user	Culture and cultural innovation
Associazione Mastronauta il Parco della Fantasia – Gianni Rodari	Public/user	Culture and cultural innovation
Associazione Canottieri Lago d'Orta	Public/user	Local services
Circolo Vela Orta - Associazione Sportiva Dilettantistica	Public/user	Local services
Associazione Dive Project	Public/user	Local services

Table 2: Stakeholder Map

2.3.3 Methodologies and actions

The research is divided into five thematic areas, each related to an interchange between the Milan Polytechnic research group and others outside GRINS research. The first area focuses on microclimate scenarios and impact assessments and involves an interdisciplinary exchange with the University of Eastern Piedmont (UPO). The second area is devoted to modeling wave effects caused by landslides, including a contribution from the Department of Civil and Environmental Engineering (DICA) of the Politecnico di Milano. The third area deals with risk management and resilient design. The fourth area deals with health prevention, disaster response, and emergency management. Finally, the sixth area

focuses on community engagement and outreach, with the Lake Orta and Mottarone Ecomuseum Association as the leader. Each area includes one or more activities that will lead to a deliverable and will be carried out in close collaboration with the advisory committee, involving the population and stakeholders. Three public events are planned as milestones to discuss with the population and present the research in its different stages. The first event will be a meeting on the effects of climate change in the Lake Orta area and the possible economic and health consequences. The second will be a seminar/conference addressed to stakeholders and public administrations on the area's risks. The third and final event will consist of an exhibition to collect and document all the research activity, tell the story of the territory and its risks under climate change scenarios, and propose strategies to make settlements more resilient. The exhibition will be accompanied by a catalog collecting all the research results and photographic documentation produced. At the end of the study, a Resilience Plan will be drafted and made available to all municipalities around the lake. This plan will provide multidisciplinary guidance to improve the area's resilience, especially in case of flooding (Figures 14 and 15).



- Stazioni ferroviarie
- Biblioteche_territorio_231211_prova
- Sedi universitarie
- Tracciati stradali entro una distanza di 15 minuti in bicicletta
- Poli universitari
- Tracciati stradali entro una distanza di 15 minuti a piedi
- Musei
- Area dei 15' a piedi dalla stazione
- Scuole superiori
- Area a 15' in bicicletta dalla stazione

Figure 14: Proximity of the educational and cultural infrastructures to the railway stations

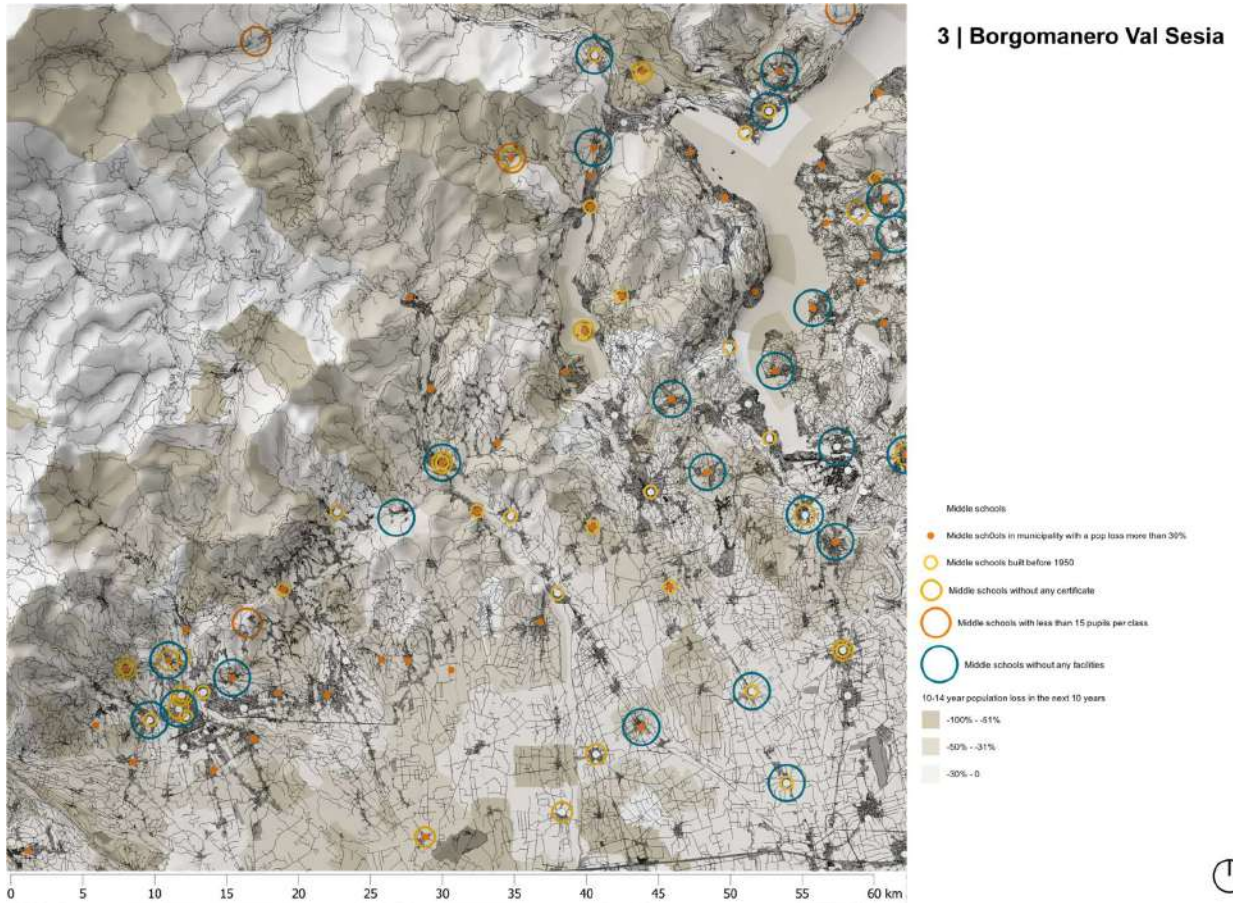


Figure 15: Distribution of schools at risk of closure.

2.3.4 Aims and impacts towards design of area-specific strategies for gap/vulnerability reduction and equalization policies

There are contexts near alpine and subalpine lakes that, although not identical, are affected by similar landslide and alluvial phenomena. Some of these contexts are significantly larger and, therefore, the Nonio landslide and Lake Orta can be considered a small-scale case study that can set the tools for studies of larger areas. The first positive impact is the ability to observe on a small scale what may occur on a larger scale elsewhere. Another positive impact is the conclusion of the work with some predictive (weather scenarios) and strategic (guidelines) documents that can serve as useful coordinates for understanding the process to be followed in other sample areas. While the modelling of catastrophic effects, risk construction, or study of health response to natural events cannot be replicated directly, the work process, reconstruction of state of the art, and other aspects of the work done can be adopted, leading to cost reductions. In addition, the project can positively impact project migration to other locations by providing a structured work framework consisting of planned activities, milestones, etc. This structured approach ensures that the methodologies and strategies developed can be adapted and applied effectively in different contexts, improving their mutability. In brief, the specific impacts we expect

include: easier replicability by considering this a small-scale case study that can provide valuable information for larger territories; lower costs for replicating the experiment because we provide documentation that can serve as useful coordinates for other areas; and optimization of replication efforts because we provide a structured working framework.

Among the specific impacts, we expect to improve the conditions under which public administration operates for two main reasons. First, we will provide them with data to increase their territory knowledge. This data will be structured, organized, and mostly georeferenced within maps designed to describe flood risk from landslides. This result will enable the public administration to understand the risks better and make more informed decisions. The second reason concerns a series of studies that we will conduct on the ground to identify hazard mitigation strategies and assess the economic impact of these strategies on local communities. Our goal is not to dictate what the public administration should do but to use project scenarios to gain a deeper understanding of the territory, reinforce the awareness that every action taken can have positive or negative impacts on the broader context, and promote a coherent strategy for the transformation of the territory, even if distributed over a long period. In addition, through the involvement of an advisory committee and local stakeholders, we aim to prepare a negotiating table for future urban planning operations. By developing guidelines, policy briefs and/or project explorations conducted on specific sites, we expect to promote dialogue among various local stakeholders (both public and private). This collaborative approach will ensure that all parties are aligned and working toward common goals.

In brief, the specific impacts we expect include: a) improved knowledge by providing structured, organized, and geo-referenced data to the public; b) easier decision-making by outlining risk mitigation strategies and their economic impact on local communities; and c) strengthening dialogue and negotiation with stakeholders by establishing the use of specific documents (policy briefs, guidelines, project scenarios) to establish agreements among stakeholders in the decision-making process.

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2.4. Irpinia, Campania. Hirpinia HS/HC station, infrastructural accessibility and local resources

Irpinia, a historical and geographical area corresponding to the province of Avellino, is centrally located between the three regions of Campania, Puglia, and Basilicata. This strategic position historically facilitated connections between the Tyrrhenian and Adriatic Seas via ancient fluvial and road infrastructures (Figure 16).

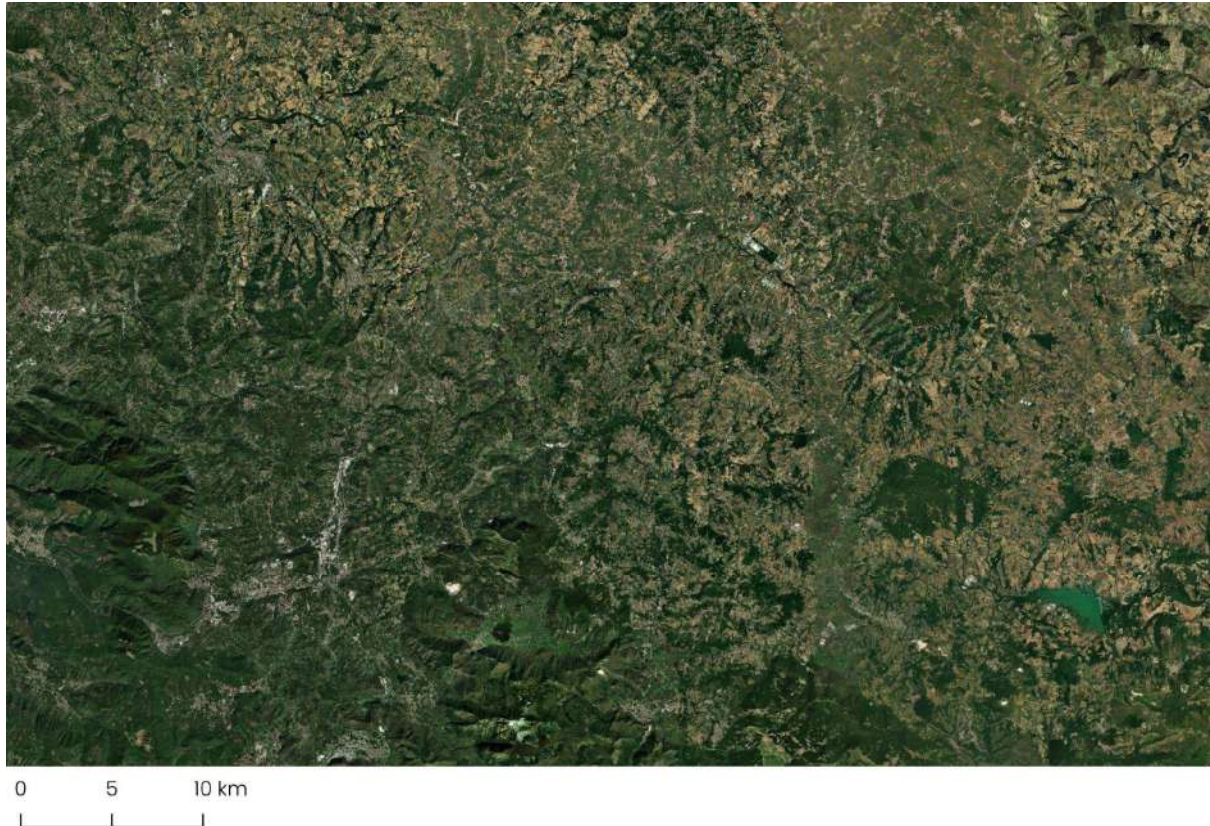


Figure 16: Satellite orthophoto of Irpinia.

The region, while still bearing the scars of natural disasters such as earthquakes and hydrogeological instability, is characterised by its unique geography and landscape. From the mountainous elevations of Terminio and the Picentini Mountains to the hydrographic system—which, with its springs and river basins, forms the largest watershed in Southern Italy—and the karstic terrain that produces remarkable geological features, Irpinia offers distinctive natural qualities. Its boundaries are clearly defined by prominent mountain ranges: the Picentini Mountains to the west and the Baronica hills to the northeast, while the valley floors, along with the rivers Calore, Ufita, Ofanto, and Sele, complete the morphological structure of the territory.

Located near the Ufita River and its tributary Fiumarella, close to the urban centre of

Grottaminarda, the new Hirpinia station of the Naples-Bari High-Speed/High-Capacity (HS/HC) railway line will be constructed along the Apice-Orsara section. This project is part of the broader Trans-European Transport Network (TEN-T), which aims to create a unified, multimodal, and sustainable transportation system for the movement of people and goods. Among the two TEN-T corridors crossing peninsular Italy—the Scandinavian-Mediterranean Corridor and the Baltic-Adriatic Corridor—the Naples-Bari HS/HC line represents the southernmost and most transversal link, ensuring rapid connections between the metropolitan hubs of Naples and Bari.

The high-speed railway line and the Hirpinia station are strategically positioned at the crossroads of east-west infrastructural connections, represented by the Naples-Bari motorway, and north-south routes, including the Lioni-Grottaminarda expressway. This geographical location represents a significant opportunity for territorial development across the Irpinia region, while also strengthening connections between Puglia, Basilicata, Naples, and the rest of Italy (Figure 17).



Figure 17: HS/HC station and railway building site.

2.4.1 Territories and specific areas

The municipalities of Grottaminarda and Apice are classified under the Italy of Mezzo system within the GRINS project's Taxonomy. Both belong to the Urban-Rural Continuum of internal mountain/hilly areas, although they differ in population density. Specifically, Grottaminarda falls into the category '2.1.1.2 - Urban-Rural Continuum of internal mountain/hilly areas with medium population density', while Apice is classified as '2.1.1.1 -

Urban-Rural Continuum of internal mountain/hilly areas with low population density'. One of the criteria in constructing the Taxonomy is the National Strategy for Inner Areas (SNAI) 2021-2027. According to this classification, Grottaminarda is part of the 'D - Intermediate' territorial system, located between the urban belt and the peripheral area. In contrast, Apice falls under the 'C - Belt' system and is also part of the pilot area of 'Fortore Beneventano'. Grottaminarda is located in the Province of Avellino. According to the latest ISTAT census of 2021, it has a population of 7,722 inhabitants, a land area of 29.11 km², and a population density of 265.26 inhabitants per km². Its proximity to Benevento, the capital of the neighboring province, makes it a densely populated municipality compared to the provincial average of Avellino, which has a population of 3,322 and a density of 140 inhabitants per km².

The historical population trend from 1951 to 2011 indicates that Grottaminarda has maintained a stable population, with a variation of +0.36%. A slight increase occurred in 1991, remaining constant until 2011, followed by a decline of -6.93% between 2011 and 2021.

ISPRA data on land consumption between 2006 and 2022 show a 2% increase. In 2006, about 13% of the territory was urbanized, while by 2022, this figure rose to 15%, covering 4.3 km². Agricultural land in Grottaminarda represents approximately 66% of the municipal area. It decreased from 2,469 hectares in 1982 to 1,932 hectares in 2020, a decline of about -22%, which aligns with the provincial average of around -26%. The number of agricultural enterprises is 418, a reduction of -54% from 1982 when there were 919. The forested area is about 70 hectares.

Apice is located in the Province of Benevento. According to the latest ISTAT census of 2021, it has a population of 5,426, covering an area of 48.69 km² with a density of 111.43 inhabitants per km². Compared to the provincial average in the same year, Apice has a population that is 58.5% higher, while the density is 13.62% lower, with the provincial average standing at 129 inhabitants per km² (Figure 18).

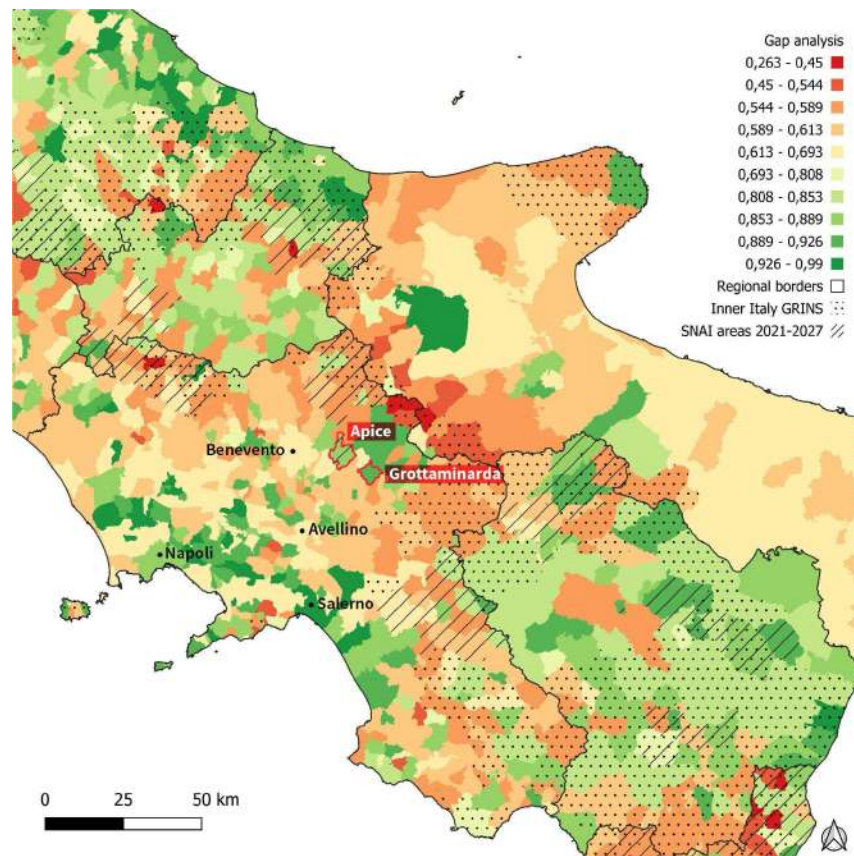


Figure 18: The gap analysis final assessment on the territory of Grottaminarda and Apice and the regional context.

The population trend from 1951 to 2021 shows a gradual decrease. In 1951, Apice's population peaked at 7,349 inhabitants, with a -26.16% variation by 2021, including significant declines of -9.8% between 1951-1961 and -11% between 1961-1971.

ISPRA data for Apice indicate a modest 7% increase in land consumption. In 2006, approximately 8% of the territory was urbanized, rising to 8.5% by 2022, equivalent to 4.1 km². Agricultural land in Apice covers about 56% of the municipal territory. It declined from 3,486 hectares in 1982 to 2,710 hectares in 2020, a -22.26% reduction, slightly above the provincial average of around -19%. The number of agricultural enterprises is 347, a decrease of -60% compared to 1982, when there were 887. The forested area is about 122 hectares.

The Gap Analysis, examined in Deliverable D7.3.3, assesses disparities based on the territorial vulnerabilities outlined in Deliverable 3.2, 'Interactive Maps on Local Vulnerability,' evaluated across three dimensions (Figure 19).

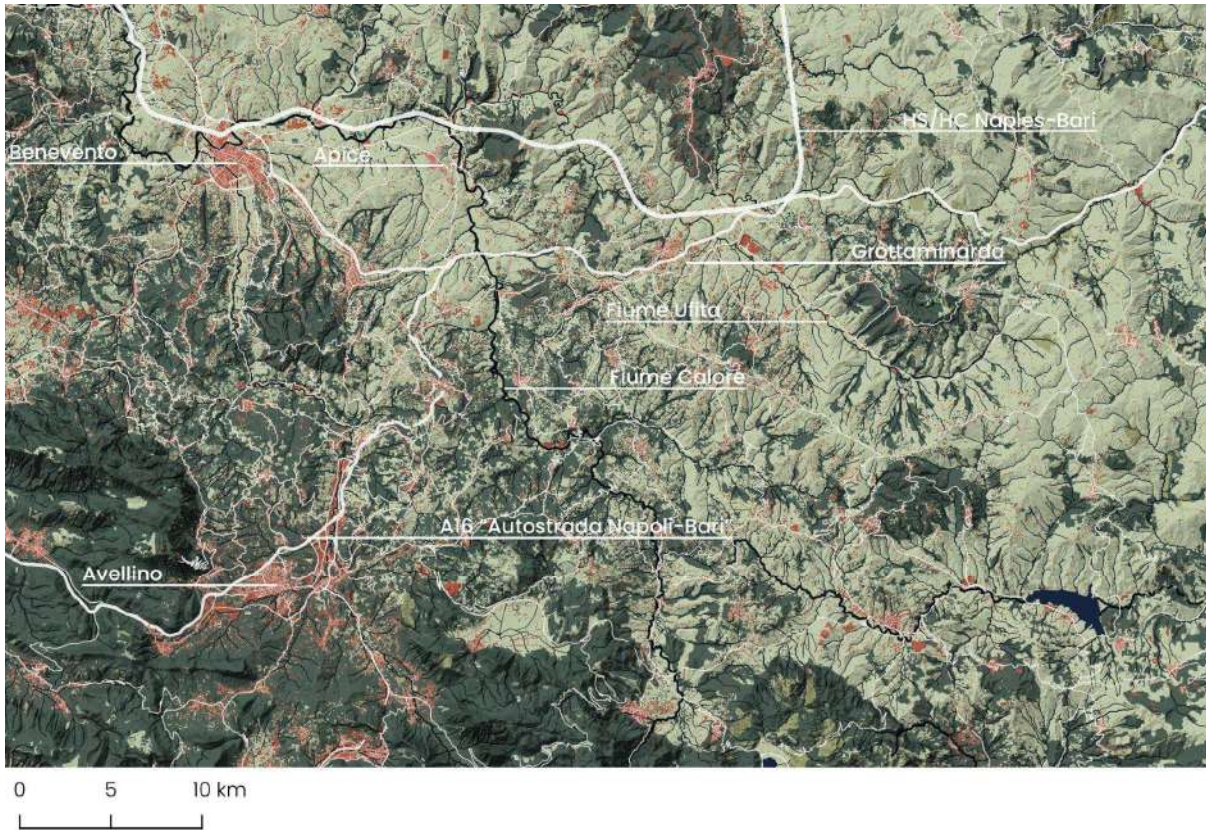


Figure 19: The territory of Irpinia is crossed by gray and blue infrastructures: A16 Motorway, the future HS/HC Naples-Bari railway line, Calore and Ufita river. Different polarities are influenced by and are related to this infrastructure: Avellino, Benevento, and the municipalities of Apice and Grottaminarda.

In the social dimension, analyzed through the indicators 'Vulnerability of accessibility to school offer' (MAP A.1) and 'Index of real estate abandonment due to lack of digital coverage' (MAP B.3), both Grottaminarda and Apice fall within medium-high ranges, not displaying significant vulnerabilities. However, indicator B.3, falling into a medium-high range, may pose challenges for the digital transition, aligning these territories with dynamics typical of Inner Italy.

The economic dimension, evaluated through the indicators 'Indicator of exposed buildings to landslide hazard at the municipal scale' (MAP D.1) and 'Indicator of exposed buildings to seismic hazard at the municipal scale' (MAP D.6), is mitigated by the absence of landslide exposure. However, seismic risk is well-known in both municipalities.

The agro-environmental dimension, based on the indices 'Index of ecological transition of agricultural asset' (MAP C.1) and 'Sustainable agricultural index for water resources' (MAP C.2), shows low vulnerability, placing both municipalities in the highest range and closer to the optimal solution. This demonstrates the administrative capacity of both municipalities to respond effectively to the ecological transition, successfully attracting funding for the agro-environmental heritage.

The MTPL for the Irpinia area identifies Apice and Grottaminarda as the first two case studies related to the theme that led to the decision to work in this area of Campania, between the

provinces of Benevento and Avellino. This decision is tied to the construction of the Av/Ac railway line with a stop in Apice and the new Iripinia station in Grottaminarda, as well as to the seismic risk conditions of the territory, which are among the key topics of the GRINS project, specifically focusing on territorial sustainability within the scope of WP3 of Spoke 7.

2.4.2 Context and stakeholders

The activities of the Multidisciplinary Territorial Policy Lab carried out in Iripinia start from a central theme: the construction of the Naples–Bari railway line and HS/HC station. This project represents such a relevant element that it calls into question the territorial balances on a trans-municipal and regional scale. What are the implications of an infrastructure project of this magnitude in an area that is atavistically characterised by a condition of internality and marginality? Because of these questions, the starting objective of the MTPL is to investigate what are the areas in which spillovers in terms of territorial sustainability can be identified, questioned, or planned.

In an initial exploratory phase, the themes underlying the MTPL's activity in relation to the aforementioned infrastructural issue question the relationship - and thus the corresponding territorial gaps - with the poles represented by the large cities close to the territory of Iripinia, which can trigger broad reconsiderations on the concept of living. Evidently this implies necessary reinterpretations of relations with the production sector (both agro-food and energy), and certainly imposes a valorisation of the cultural heritage and therefore of the landscape. In this sense, the territory under study is of great specific interest also because it is strongly marked by the traces of transformative processes linked to seismic and hydrogeological risks and these hazard conditions are called into question through the transformations taking place in their relationship with the concepts of vulnerability and attractiveness.

Thus, in this first case, a vast territory - straddling two provinces - and a multitude of stakeholders of varying sizes are investigated as a potential critical mass. Therefore, the field experiments carried out so far within the MTPL have identified the following as the main stakeholders: the municipal administrations of the areas under study, the political figures involved in the implementation of the High Speed Railway project, professionals working in the architecture and landscape sector, third sector associations and bodies, citizenship, organisers and promoters of cultural reviews and events, museum directors, professionals and politicians working in the cultural heritage sector, entrepreneurs in the territory (Figures 20).



Figure 20.a: Educational and research activities at "bar della diga" in Conza della Campania.

Figure 20.b: Mrs. Mena, a lady that used to live in Apice Vecchia while describing how life was there.

Figure 20.c: Field trip in Grottaminarda, the research team moving toward the HS/HC train station.

Figure 20.d: Public presentation of the ongoing activities at the Auditorium in Apice Nuovo.

Entity/association/ organization name	Domain	Expertise
Osservatorio Vesuviano - INGV	Research	Transversal
UNINA DiARC	Research	Transversal
UNINA DICEA	Research	Transversal
ENSA PARIS BELLEVILLE	Research	Transversal
University of Essex	Research	Transversal
Progetto di ricerca REPLACE	Research	Transversal
POLIMI	Research	Transversal
Centro Studi PLINIVS	Research	Transversal
Oscata Invita	Public/user	Culture and cultural innovation
IrpiniaMia	Public/user	Culture and cultural innovation
Laceno D'Oro	Public/user	Transversal
Corto e a Capo	Public/user	Culture and cultural innovation
Ariano Film festival	Public/user	Culture and cultural innovation
San Martino Film Festival	Public/user	Culture and cultural innovation
Archeoclub di Apice	Public/user	Culture and cultural innovation
Genti delle Aiture	Public/user	Culture and cultural innovation
Comitato del Venerdì Santo	Public/user	Culture and cultural innovation
Associazione di Santa Maria	Public/user	Culture and cultural innovation
Associazione teatrale "La Fermata"	Public/user	Culture and cultural innovation
Associazione "Escape Irpinia"	Public/user	Culture and cultural innovation
Ariano Folk Festival	Public/user	Culture and cultural innovation
Dopolavoro Culturale	Public/user	Culture and cultural innovation
People Involvement Fest	Public/user	Culture and cultural innovation
Ecomunera	Public/user	Culture and cultural innovation
Club Rotary Avellino Est Centenario	Policy	Culture and cultural innovation
Ordine degli Architetti di Avellino	Policy	Transversal
Ordine degli Agronomi di Avellino	Policy	Transversal
ANIAI Campania	Policy	Transversal
Parco Archeologico di Aeclanum	Policy	Culture and cultural innovation
Museo archeologico di Carife e della Baronìa	Policy	Culture and cultural innovation
Soprintendenza ABP di Salerno e Avellino	Policy	Culture and cultural innovation
Museo Civico di Frigento	Policy	Culture and cultural innovation
Museo Irpino	Policy	Culture and cultural innovation
Osservatorio sul Doposisma	Policy	Transversal
Ente Parco Taburno-Camposauro	Policy	Sustainable agrifood systems and ecosystem management

Entity/association/ organization name	Domain	Expertise
Consorzio Dop Ravece	Policy	Sustainable agrifood systems and ecosystem management
Slow Food Campania	Policy	Sustainable agrifood systems and ecosystem management
Confindustria Avellino	Industry/services/investors	Transversal
RFI	Industry/services/investors	Sustainable multimodal mobility
Oasis Sapori Antichi	Industry/services/investors	Sustainable agrifood systems and ecosystem management
MP Trade srl	Industry/services/investors	Local services
Cantina SANG	Industry/services/investors	Sustainable agrifood systems and ecosystem management
Aivil Progetti	Industry/services/investors	Local services
ArcheoServizi	Industry/services/investors	Local services
Azienda Biologica Il Rassecale	Industry/services/investors	Sustainable agrifood systems and ecosystem management
Associazione Aglianico Lasco	Industry/services/investors	Sustainable agrifood systems and ecosystem management
Cantina Giardino	Industry/services/investors	Sustainable agrifood systems and ecosystem management
Casa Brecceto	Industry/services/investors	Sustainable agrifood systems and ecosystem management
Vineria La posta/Enorme Apis	Industry/services/investors	Sustainable agrifood systems and ecosystem management
BioLu	Industry/services/investors	Sustainable agrifood systems and ecosystem management
Koala	Industry/services/investors	Local services
Comune di Grottaminarda	Policy	Transversal
Comune di Vallata	Policy	Transversal
Comune di Mirabella Eclano	Policy	Transversal
Comune di Bisaccia	Policy	Transversal
Comune di Trevico	Policy	Transversal
Comune di Castel Baronia	Policy	Transversal
Comune di Carife	Policy	Transversal
Comune di Vallesaccarda	Policy	Transversal
Comune di Apice	Policy	Transversal
Comune di Flumeri	Policy	Transversal
Comune di Ariano Irpino	Policy	Transversal
Comune di Frigento	Policy	Transversal

Table 3: Stakeholder Map

2.4.3 Methodologies and actions

The actions undertaken within the MTPL thus directed attention toward the emerging themes interpreted concerning the new Naples-Bari HS/HC route, which facilitated the

identification of a trans-municipal area of interest. Consequently, starting from the Hirpinia station and its relationship with the Apice station, a vast territory was pinpointed as a basis for rethinking territorial sustainability in the region. After establishing a system of common ground during the 'background' phase, the territory was investigated using the methods outlined in the 'common ground' phase, wherein the roles and competencies of the research group were assessed to identify interlocutors to collaborate with. This included analyzing the morphological structure of the territory, conducting surveys of selected sites of interest, adopting a historiographic approach to understand transformative processes, performing data analysis, organizing surveys and round tables with local actors and stakeholders, and developing and discussing project proposals. The actions taken in the 'landing' phase aim to interpret a complex palimpsest to define, on the one hand, intervention priorities and, on the other, the vocations to be enhanced and strengthened. In this sense, the MTPL's activities are currently proceeding in two directions. One refers to the vast territory by placing the new Hirpinia station and the linear infrastructure afferent to it as the central focus. The second, on the other hand, is trying to be more precise: we have returned to the background phase in order to be able to deal in greater detail with the case of Apice, which from the first exploration conducted proved to be of interest due to the specificities relating to the liveliness of its community, on the one hand, and the variety of its built heritage, referable to a centuries-old seismic history, on the other.

Proceeding to the 'interacting' phase, data analysis and data production represent two central moments of the research that hold together the research phases of field and in-lab experiments. This shared wealth of knowledge represents the premise for a verification phase that is intended to be undertaken as a preliminary and necessary moment for the definition of transformative strategies and policies.

Again in synergy with other organisations and institutions, three research activities were conducted in order to identify and involve stakeholders interested in contributing to a rethinking of transformative processes and thus of the policies implemented:

- The 'Living Lab Irpinia Plurale' held in Flumeri and Carbonara as part of the 'Territori Plurali' Architecture Festival. In particular, a Collaborative Mapping of Possible Futures of the Ufita Valley was conducted on 23 June 2023. On this occasion citizens, associations, institutions and entrepreneurs were invited to participate in order to build together a process of dialogue and a network of ideas, actions and practices for the future of the Ufita Valley starting from the Hirpinia station area.

- The 'Irpinia' summer school as part of the 2nd level Master's programme 'Architecture and design for inland areas and small towns - ARiNT'. From 04 to 07 September 2024 the territory was explored and debated in a series of round tables with local stakeholders and actors: 'Stazione Hirpinia. Logistic Hub and Territory', "Cultural assets and territorial regeneration, listening to experiences, experimentations, actions in motion", "The historical archaeological heritage in Irpinia: territory, infrastructures and visions of development", "Waterways, territory, infrastructures and visions of development", "Landscape, culture, wine, food to re-inhabit the countries", "Ecology, environment and energy, experimentations and innovations in Irpinia". So the issues of quality agri-food and wine production, landscape transformation in relation to the region's water heritage, cultural production with special focus on film production, and the valorisation of the historical, artistic and archaeological heritage were explored.

- The international workshop and field research 'Build Back Better: territorial sustainability of

landscape at risk between multiple temporalities and scales. Apice as a case study and Campania region as a field' conducted by the Department of Architecture of the University of Naples "Federico II" in synergy with the DSA Architecture et Risques Majeurs of the École nationale supérieure d'architecture de Paris-Belleville. On this occasion, issues relating to the residential heritage and, more generally, to the concept of inhabiting an area that has been strongly marked by an important seismic history, with the earthquakes of 1930 and 1980 being two major phenomena. The main physical traces of these phenomena are abandoned villages, new towns and ruins of temporary heritage; all forms of the built environment awaiting necessary rethinking in the light of profound social, demographic and territorial changes.

Through these two actions, actors and places of interest were identified to conduct process and design experiments aimed at verifying the impacts of the HS/HC line (Figures 21, 22 and 23).

CA23 **territori plurali** festival di architettura

living lab **Flumeri Carbonara irpinia plurale**

HIRPINIA PLURALE | Mappatura collaborativa dei futuri possibili della Valle dell'Ufita

incontro01
23 giugno 2023 ore 16.00-19.00 / living lab

dogana aragonese
via doganelle
flumeri (AV)

A cura di
ADELINA PICONE

con la collaborazione di
MARIA CERRETA
ANGELA D'AGOSTINO
ENRICO FORMATO
PAOLA GALANTE

Nicola Fierro
Teresa Gargiulo
Caterina Mennella
Meris Lucia Raiola
Sabrina Sacco
Piero Zizzonia

Cittadini, associazioni, enti ed imprenditori sono invitati a partecipare per costruire insieme un processo di dialogo ed una rete di idee, azioni e pratiche per il futuro della Valle Ufita a partire dall'area della stazione Hirpinia.

Il processo sarà supportato dal Diarc nell'ambito del Living Lab Hirpinia Plurale del Festival dell'Architettura. Con la partecipazione del gruppo di ricerca PES/Design for sustainability, attractiveness and resilience policies for **TERRITORIAL INTERSECTIONS**.

campaniaarchitettura.it



Il Living Lab Hirpinia Plurale è un progetto finanziato dalla Regione Campania, con il contributo del Ministero dell'Università e della Ricerca e della Direzione Regionale Campania del Ministero dell'Università e della Ricerca.



Figure 21: Manifesto and agenda of the 'Living Lab Irpinia Plurale' held in Flumeri and Carbonara as part of the 'Territori Plurali' Architecture Festival.

BUILD BACK BETTER: TERRITORIAL SUSTAINABILITY OF LANDSCAPE AT RISK BETWEEN MULTIPLE TEMPORALITIES AND SCALES Apice as a case study and Campania region as a field

<p>SAT 02 11 24 / NAPOLI</p> <p>arrival in Naples</p> <p>Marianna ASCOLESE Rosa SESSA 15:30 on site Lecture "The Ancient Centre of Naples and its Margins"</p>	<p>SUN 03 11 24 / NAPOLI</p> <p>Marica CASTIGLIANO Federica DELL'ACQUA Grazia POTA 10:30 on site Lecture "East Naples: the public city 44 years later" arrival in Apice</p>	<p>MON 04 11 24 / APICE</p> <p>opening with Angelo PEPE Mayor of Apice 9:00 S.KASRI D. LERCHE J. POUJIN G. VANNELLI Teaching Staff</p> <p>Alessio ERRICO Antonio FRUSCIANTE 9:30 Adele PICONE 10:00 "Irpinia region and the Master ARINT" site visit 11:00 infrastructure and little villages Angela D'AGOSTINO 16:15 "GRINS in the Italian Inner Areas" Ronato CAPOZZI 17:00 "Teora: a reformulated city" Nicola FLORA 17:45 "Experimenting within the abandonment (with communities)"</p>
<p>TUE 05 11 24 / APICE</p> <p>site visit 08:30 traces and palimpsest: heritage from the 80s Bruna DI PALMA 15:45 "The path of reconstruction. Urban morphologies ten years after the earthquake in Emilia Romagna" Emilia CORRADI 16:30 "Processes and projects for resilient communities" Antonio FORMISANO 17:15 "Seismic analysis and innovative retrofit interventions on masonry building aggregates"</p>	<p>WED 06 11 24 / APICE</p> <p>SURVEY Mario LOSASSO Sara VERDE 16:45 "Settlements, resources, environment: the PSER between tradition and innovation" Giulio ZUCCARO 17:30 "The Plinius Study Centre within Civil Protection Activities"</p>	<p>THU 07 11 24 / APICE</p> <p>SURVEY Paola DI GIUSEPPANTONIO DI FRANCO 16:30 "30 Technologies for Community Resilience: Rebuilding Heritage and Sense of Place in Post-earthquake Italy" Stefano VENTURA 17:30 "Irpinia 1980: historical outline of the reconstruction"</p>
<p>FRI 08 11 24 / APICE</p> <p>Raffaele CATUOGNO Riccardo FLORIO 09:00 Rossella MARENA Bianca Giola MARINO "Mirabella Eclano and Conza della Campania: drawing, restoring, rethinking" SURVEY Antonio MESISCA Luigi MESISCA 15:00 on site Lecture "Apice: archeology and fragments" Dominique LERCHE 16:30 "Urban resilience" Sarra KASRI Francesco RISPOLI 17:00 Giovangiuseppe VANNELLI "In-field research: living lab as a strategy" PRESENTATION FILM PROJECTION 18:30 CHRISTMAS MARKET</p>	<p>SAT 09 11 24 / NAPOLI</p> <p>departure from Apice Luigi CAPPELLI Francesca COPPOLINO Anna TERRACCIANO 14:30 on site Lecture "Campi Flegrei: a palimpsest at risk"</p>	<p>SUN 10 11 24 / NAPOLI</p> <p>Maria Pia AMORE 10:00 on site Lecture "Pompei: a contemporary design matter" departure from Naples</p>

02|11|24 - 10|11|24 | INTERNATIONAL WORKSHOP AND IN-FIELD RESEARCH
ORGANISED BY DSA ARCHITECTURE ET RISQUES MAJEURS | ENSA PARIS BELLEVILLE | SARRA KASRI, DOMINIQUE LERCHE, JEREMY POUJIN | WITH LABORATORIO DI COMPOSIZIONE ARCHITETTONICA E URBANA 4D | DIARC - UNINA | ANGELA D'AGOSTINO, BRUNA DI PALMA | COORDINATED BY GIOVANGIUSEPPE VANNELLI | WITHIN GRINS "GROWING RESILIENT, INCLUSIVE AND SUSTAINABLE" - PE9 - SPOKE7 | WITH THE COLLABORATION OF MARIA CERRETA, GAETANO FALCONE, PAOLA FORTUNATO, TERESA GARGIULO, CATERINA MENNELLA, ANTONIO MESISCA, MARIA SOMMA, GENNARO VITOLO, PIERO ZIZZANIA.









T E M P -

Figure 23: Manifesto and agenda of the International workshop and in-field research "Build Back Better: territorial sustainability of landscape at risk between multiple temporalities and scales. Apice as a case study and Campania region as a field".

Specifically in relation to the seismic risk topic, the DICEA team would contribute to the MTPL

based on the in deep insight work that will be carried out in this last year to the quantification of natural hazards concerning seismic and instability phenomena characterizing the inner area of Irpinia. The area is significantly exposed to risks arising from natural phenomena such as earthquakes slope instability induced by climate and seismic activity. Indeed, numerous scientific studies propose hazard and susceptibility maps at a national scale, aiming to provide a useful tool for risk mitigation through various levels of detail.

For instance, the reference seismic hazard study for the Italian territory is the one produced by the National Institute of Geophysics and Volcanology, INGV, known as MPS04-SI (Meletti & Montaldo, 2007; Montaldo & Meletti, 2007; Stucchi et al., 2011). Hazard is represented in terms of Peak Ground Acceleration (PGA) and spectral acceleration (S_a) for nine spectral periods, T . The values of these parameters are provided for approximately 11,000 points on a reference grid that divides the national territory, identified by geographic coordinates of longitude and latitude, and for 7 return periods, TR: 30, 50, 72, 101, 140, 201, 475, 975, and 2475 years. Based on this study, it can be verified that the areas of interest exhibit the highest hazard compared to the rest of the national territory in terms of both PGA and S_a ¹.

Even for this type of hazard, it can be observed that the project's area of interest has experienced instability and is exposed to the initiation of future events, characterized by a higher hazard index compared to the rest of the Italian territory.

It is important to note that the aforementioned studies are based on non-site-specific data, and therefore, they may be affected by high uncertainty and variability. Additionally, the area of interest is characterised by a very complex geological setting that plays an important role in the determination of the hazards affecting the study area.

The Irpinia inner area is occupied by the Apennines chain, formed by overlapping tectonic units constituted by carbonatic and basin/terrigenous flysch deposits, which are bounded along the coasts by more recent sediments of marine, alluvial and volcanic origin. In particular, the flysch deposits consist of alternating and highly deformed or completely disarranged rock and argillaceous layers. Their intrinsic lithological heterogeneity and complex fabric, along with the deteriorability of the hard fine-grained component, make extremely difficult material characterization for engineering purposes.

Considering the problems posed by these deposits to the stability of ancient towns and villages of historic relevance caused by both meteoric and seismic events, and to the construction of roads, highways, tunnels or pipelines crossing the internal mountainous areas, the DICEA team of Spoke 7-GRINS will give a contribution on the knowledge of the peculiar mechanical and hydraulic behavior of these complex formations with the aim of quantifying their influence on the local natural hazards.

To this aim, an extensive investigation will be carried out in a wide area occupied by the so-called Flysch Rosso ("Red Flysch", here referred as RF), where the new high-speed railway line Naples-Bari is going to be built. Data coming from a wide in situ investigation showed that the hydraulic and mechanical behavior of this material seems to be essentially

¹ Susceptibility to slope instability can be assessed both ex-ante and ex-post by consulting national catalogs such as the Inventory of Landslides in Italy (IFFI), respectively published at the following web addresses: <https://idrogeo.isprambiente.it/app/pir?@=41.08684156502318,15.085897292212795,3> and <https://idrogeo.isprambiente.it/app/iffi?@=40.92614086264143,15.488980478722876,3>.

governed by the fine-grained component, even though the contribution of rocky or coarse-grained cemented layers or blocks is not negligible. For this reason, its mechanical behavior requires proper calibration of the mechanical parameters. The hydraulic and mechanical response of these formations depends on the combined influence of the basic properties of the individual components, the mesofabric of the fine-grained component, and the macro-fabric of the entire system. However, ordinary laboratory devices can only investigate volumes up to approximately 10⁻³ m³, highlighting only the role of the basic properties and the mesofabric of the fine-grained component. Therefore, in many cases, laboratory tests may not be adequate for characterizing the mechanical behavior of such geomaterials because larger material volumes should be considered. In-situ tests, on the other hand, can provide useful information about the response of the entire system, taking into account the role of the macro-fabric, up to a volume of about 1 m³, neglecting the role of discontinuities and of rock or of coarse-grained cemented blocks or layers at a higher scale. Hence, an adequate ratio between the size of the testing devices and the spacing of discontinuities or the dimensions of rock blocks is crucial to evaluate the representativeness of the data. Given the above, it is important to note that the characterization of formations such as Red Flysch requires the use of non-ordinary instrumentation and equipment. Standard laboratory equipment, typically suited for smaller sample volumes, can capture only limited aspects of these complex materials, often neglecting key large-scale characteristics. An adequate ratio between the scale of the testing equipment and the spacing of discontinuities or dimensions of rock blocks is essential to obtain representative data. For complex formations like Red Flysch, therefore, specialized instrumentation is required to conduct accurate assessments. For this reason, within the GRINS project, DICEA team started the acquisition of a triaxial device specifically devoted to carry out tests of specimens of enhanced dimensions.

The new device will give the opportunity to obtain precious data on the behavior of the complex flysch formation, widespread in the study area. These will allow to obtain a proper characterization of this formation that, in turn, will be used to quantify site specific hazard both in terms of seismic and instability phenomena. MTPL will have the opportunity to share with the local communities, stakeholders and local authorities the results of the territorial study on local hazard, involving them in the discussion on the planning and management of local territories.

In conclusion, studying areas characterized by high hazard, susceptibility, and complex geomaterials not only helps to assess risks more accurately but also tests the effectiveness of broad-scale studies. Using advanced, specialized equipment in such regions enables a more reliable understanding of material behavior, ultimately supporting safer infrastructure and risk mitigation strategies.

2.4.4 Aims and impacts towards design of area-specific strategies for gap/vulnerability reduction and equalization policies

Field experiments planned as part of the multidisciplinary territorial laboratories are proposed as a tool to understand and tackle vulnerabilities and inequalities in the territories of Inner Italy. In particular, in the Irpinia territory, the first objective of MTPL is to extend

reflections and actions beyond the municipality perimeters which will accommodate the aforementioned infrastructures. The aim is to refer with a systemic approach to a wider area and linked themes, fostering synergies and actively involving public and private stakeholders. The activities organised within the MTPL and the presence of the University in these territories activate dynamics, processes and collaborations. This is fundamental because it is only through an appropriate verification of themes, territories and stakeholders that a real impact can be sought in the definition of innovative perspectives for the sustainable development of territories, even more so for a complex project such as the HS/HC line Naples–Bari and the Hirpinia station.

The construction of a new HS/HC railway station and the impacts it will involve on the Irpinia territory represent a unique opportunity to define the geographies of this territory. While it will increase connections between multiple territorial dimensions, it may also activate a series of socio-economic transformations in the territories directly and indirectly affected by the infrastructural processes. However, in order to prevent these changes from being limited to economic exploitation or polarisation, it is essential to adopt an integrated approach in which MTPL can be a support to identify new ways to re-inhabit the territories of Inner Italy, making them attractive to new generations, residents and manufacturing activities, encouraging a balanced and sustainable use of local resources, and enhancing the territories' identity features.

Starting from working tables, meetings with stakeholders, and research activities in the laboratory, the MTPLs are interested in outlining the possible impacts of the planned infrastructures on the urban, rural, social and economic fabric, and more broadly on the ways in which these places can be re-inhabited – both in the historical fabric and in that built – after the earthquake, as well as in that awaiting reconstruction.

The MTPLs aim to build a wide-ranging network of stakeholders rooted in the territory, in relation to which we can define transformation scenarios, design hypotheses, and therefore innovative perspectives for sustainable development, based on the project of the HS/HC Naples–Bari railway line and the Hirpinia station.

2.5 Atena Lucana, Campania. Cultural Landscape of Vallo di Diano and participatory process for tangible/intangible assets

The municipality of Atena Lucana is located in the province of Salerno, in the Campania region, positioned in the southern part of the Vallo di Diano. According to the GRINS classification, Atena Lucana's territory falls within an intermediate dimension between Inner Italy and Central Italy. This area is strategically located near the A2 Mediterranean Highway corridor, facilitating connections with other territorial areas (Figure 24).



Figure 24: Satellite orthophoto of the Vallo di Diano.

An analysis of the municipality's socio-economic structure reveals a predominance of agricultural and pastoral activities, which are traditional resources but limited in terms of economic development potential. From a territorial perspective, the historic center retains significant cultural and architectural heritage, while the surrounding hamlets and nearby areas feature more recently constructed residential buildings, often linked to local families or new commercial activities. The combination of historical legacy and recent urbanization creates a varied but fragile territorial profile, requiring place-based and sustainable strategies for regeneration and enhancement.

2.5.1 Territories and specific areas

The municipality of Atena Lucana, according to the GRINS project taxonomy, falls within the Central Italy system and belongs to the Continuum Urban-Rural Mountain/Hill Internal system but differs in terms of population levels. Specifically, Grottaminarda is categorized as '2.1.1.2 - Continuum Urban-Rural Mountain/Hill Internal with Medium Population Density,' while Apice falls into '2.1.1.1 - Continuum Urban-Rural Mountain/Hill Internal with Low Population Density.'

In relation to the National Strategy for Inner Areas (SNAI) 2014-2020, Atena Lucana is classified as a 'D - Intermediate' municipality, positioned between the urban belt and the peripheral area. It is part of the SNAI project area in the Campania Region called "Vallo di Diano," alongside the municipalities of Pertosa, Polla, Sant'Arsenio, San Pietro al Tanagro, San Rufo, Teggiano, Sala Consilina, Monte San Giacomo, Sassano, Padula, Buonabitacolo, Sanza, Casalbuono, and Montesano sulla Marcellana.

Atena Lucana covers a municipal area of 25.73 km², characterized by a predominantly hilly landscape with altitudes ranging between 500 and 700 meters above sea level. Demographically, it has a population of about 2,370 inhabitants (as of 2024), with a population density of approximately 91 inhabitants per km². The latest ISTAT census of 2021 recorded a population of 2,396. Historical population data from 1951 to 2021 show a slight but steady decline over the last two decades. The population peaked in 1951 at 2,596, reflecting a 7.70% decrease by 2021, with significant declines of 6.9% in 1951-1961 and 11.3% in 1961-1971, compared to a 15.9% drop between 1981 and 1991 (Figure 25).

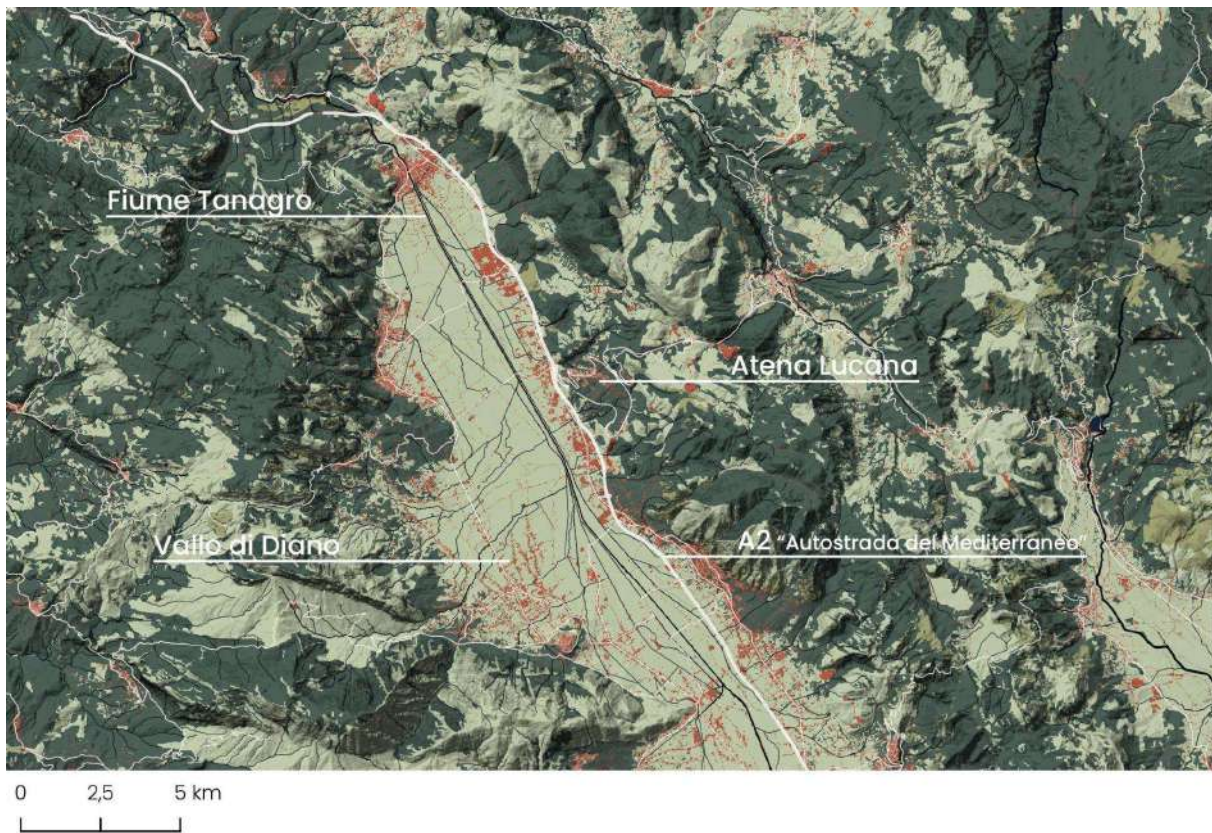


Figure 25: The Vallo di Diano territory, crossed by the Tanagro river and the more recent A2 motorway, sees numerous villages built in relation to the peculiar orography, among which the municipality of Atena Lucana stands out.

In terms of social aspects, assessed through the 'Vulnerability of Accessibility to School Offer' indicator (MAP A.1) and the 'Index of Real Estate Abandonment Due to Lack of Digital Coverage' (MAP B.3), Atena Lucana ranks within a very high range and does not exhibit significant vulnerabilities compared to other contexts. However, its B.3 index, positioned at a medium-high level, could pose a challenge for digital transition. This condition is common among many Italian municipalities situated between Inner Italy and Central Italy.

According to ISPRA data, in 2006 the land consumption rate was 11.10% of the municipal territory, equivalent to 2.86 km². By 2022, the situation remained almost unchanged, with a land consumption rate of 12%, corresponding to 3.11 km². Agricultural land constitutes approximately 33.93% of the municipal territory. It decreased from 1,673 hectares in 1982 to 873 hectares in 2020, reflecting a decline of about 48%. This reduction is significantly higher than the provincial average, which recorded a decrease of around 28%. There are 344 agricultural enterprises in the area, indicating the region's strong agricultural and productive vocation. In 1982, there were 495 agricultural enterprises, marking a 30% decline. Forested areas are quite extensive, covering 598 hectares, which is nearly 6 km², accounting for approximately 23% of the municipal territory.

The economic dimension, evaluated through indicators such as the 'Indicator of Exposed Buildings to Landslide Hazard at Municipal Scale' (MAP D.1) and the 'Indicator of Exposed

Buildings to Seismic Hazard at Municipal Scale' (MAP D.6), shows mitigation in landslide risk. However, from a seismic perspective, the municipality does not present a significant economic gap (Figure 26).

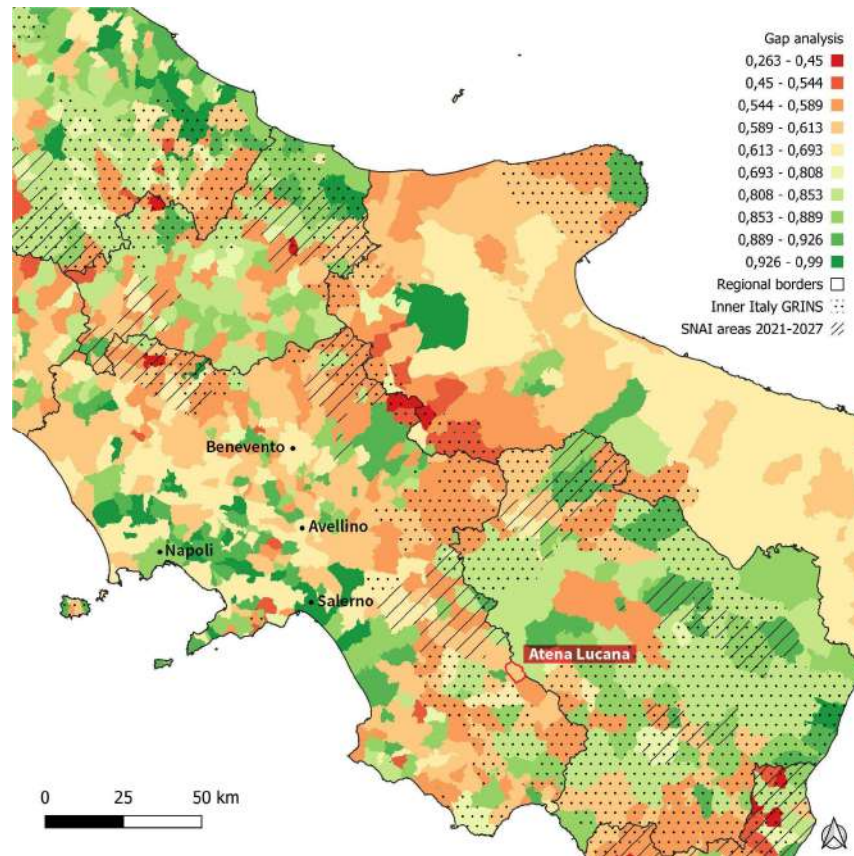


Figure 26: The gap analysis final assessment on the territory of Atena Lucana and the regional context.

Regarding the agro-environmental dimension, analyzed through the 'Index of Ecological Transition of Agricultural Assets' (MAP C.1) and the 'Sustainable Agricultural Index for Water Resources' (MAP C.2), a slight gap is observed, mitigated by some ongoing or planned interventions. This demonstrates the municipality's administrative capacity to address ecological transition and attract funding for agro-environmental resources.

2.5.2 Context and stakeholders

The ongoing MTPL activities intertwine with a complex process initiated through the Archivio Atena project, which won the public call "Attrattività dei borghi" and is funded by resources from the National Recovery and Resilience Plan (PNRR M13). The project, led by the Municipality of Atena Lucana (SA) in collaboration with other local stakeholders, focuses on cataloging and enhancing the tangible and intangible heritage that defines Atena Lucana's identity. This involves creating a Community Archive in partnership with artists, entrepreneurs, and residents of the small town. The ultimate goal of this permanent territorial laboratory is to foster a deep understanding of the area and support an

integrated strategy of interventions aimed at enhancing social, cultural, and environmental capital.

The territory of Atena Lucana, in its complexity and vastness, encompasses a variety of stakeholders. The field and in-lab experiments conducted thus far within the MTPL framework have engaged key local actors: the resident community, municipal administrations, art and architecture professionals, associations and third-sector entities, as well as entrepreneurs operating in or linked to the area.

The multidisciplinary and participatory approach of the MTPL aims to strengthen ties between these parties, creating a model of shared governance that can support regeneration processes while respecting and enhancing the unique character of Atena Lucana and its communities.

Entity/association/ organization name	Domain	Expertise
UNINA DiARC	Research	Transversal
Archivio Atena	Research	Transversal
ICCD - Istituto Catalogo e Documentazione	Research	Transversal
ISIA Urbino	Research	Transversal
Comune di Atena Lucana	Policy	Transversal
Comunità di Atena Lucana	Policy	Transversal
Comunità Montana	Policy	Transversal
Parco Nazionale del Cilento, Vallo di Diano e Alburni	Policy	Transversal
Associazione Amici di San Ciro	Public/user	Culture and cultural innovation
Forum Giovani di Atena Lucana	Public/user	Local services
Pro-Loce	Public/user	Culture and cultural innovation
La Domenica delle Bambine e dei Bambini	Public/user	Culture and cultural innovation
Polisportiva Atena Lucana	Public/user	Culture and cultural innovation
Amico Fritz	Public/user	Culture and cultural innovation
Officina del Cucito (gruppo informale)	Public/user	Culture and cultural innovation
Comitato festa (gruppo informale)	Public/user	Culture and cultural innovation
Le Case di Igea	Public/user	Local services
Locanda San Cipriano	Industry/services/investors	Sustainable agrifood system and ecosystem management
Talea Experience	Industry/services/investors	Sustainable agrifood system and ecosystem management
Wipa Marmi	Industry/services/investors	Culture and cultural innovation

Entity/association/ organization name	Domain	Expertise
Arboretum	Industry/services/investors	Sustainable agrifood system and ecosystem management
Gruppo informale per la futura impresa di comunità	Industry/services/investors	Transversal

Table 4: Local stakeholders involved

2.5.3 Methodologies and actions

The primary objective of the MTPL is to support the ongoing multi-stakeholder territorial process aimed at enhancing and promoting the complex, tangible, and intangible values of the Atena Lucana area, with particular attention to the perspectives of local communities. The MTPL's contribution aligns closely with the goals of the Archivio Atena project and focuses on assisting local actors and stakeholders in defining integrated territorial policies and strategic design approaches to landscape valorization.

In line with UNINA's general methodology, several parallel activities (including field and in-lab experiments) are underway to trigger collaborative, multi-scalar processes for the co-construction of in-depth, multidisciplinary knowledge about the area.

The "background" activities began by identifying Atena Lucana as the center of a broader territorial system called "Vallo di Diano and Alburni." During the initial "Common Ground" phase, seminars, community roundtables, and public meetings were organized to engage all stakeholders involved in the Archivio Atena project and other local actors from neighboring municipalities.

The research team currently managing and organizing the activities in the area comprises individuals with diverse expertise, including urban studies, sustainable territorial evaluation and planning, sociology, civic participation, art and photography, archiving, and specialized knowledge of the region's history, traditions, landscapes, and natural resources.

This diversity of perspectives and skills translates into a complex array of tools and outputs used to map the economic, environmental, social, and cultural values crucial for enhancing the Vallo di Diano territory. Specifically, the ongoing "landing" phase includes the following territorial research activities:

- mapping and engaging additional local stakeholders who can synergistically contribute to the current project through territorial explorations and the activation of a regional network;
- conducting qualitative research by blending action-research tools and artistic practices, using participatory observation techniques and social research, often in collaboration with resident artists;
- collecting place-based data and indicators to monitor and evaluate local landscape valorization efforts through co-design workshops, collective and educational labs, and community events;
- processing territorial data using GIS tools to create thematic maps and develop multi-criteria decision support systems.

Initial results include deeper insights into the territorial values of Atena Lucana, developed through continuous interaction with the local community. Field explorations, photographic campaigns, and community workshops have initiated a participatory process to recognize

and enhance the area's identity, exploring both tangible and intangible aspects (Figure 27).

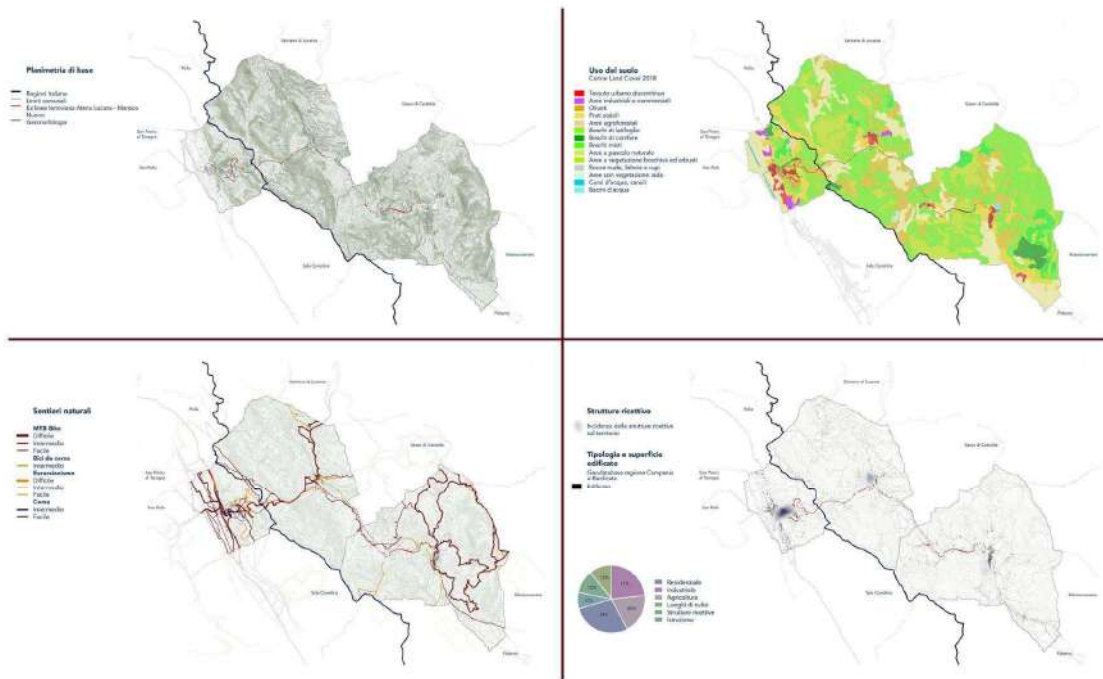


Figure 27: Examples of maps produced to describe the tangible and intangible characteristics of the cultural landscapes of Atena Lucana and the neighboring municipalities connected by the former railway line.

At a territorial scale, Atena Lucana is seen as part of the broader environmental and socio-economic system of Vallo di Diano and as the starting station of the former FCL railway line to Brienza and Marsico Nuovo. These supra-municipal systems offer opportunities to develop a valorization project that respects the community's unique characteristics and shared values, generating benefits for areas surrounding Atena Lucana. This multi-scalar approach ensures a balance between local values and the broader context, addressing both community needs and territorial characteristics (Figure 28).



Figure 28: Some photos documenting the workshops, focus groups, and meetings held with the community and local institutions of Atena Lucana, both on the territory and at the Department of Architecture of the University of Naples Federico II.

Locally, a management group—comprising community members, cultural facilitators, and university researchers—has established a permanent community laboratory based on participatory and deliberative co-design tools. These activities support collective participation and aim to develop an experimental, adaptive, and inclusive governance model capable of addressing the area's challenges and opportunities.

Through mutual learning workshops and the use of family photographs, new local values are emerging, while surveys and focus groups have identified specific needs and preferences for designing shared spaces. Additionally, collective art interventions and training programs to develop innovative businesses and local skills have strengthened social bonds and awareness of the shared heritage.

2.5.4 Aims and impacts towards design of area-specific strategies for gap/vulnerability reduction and equalization policies

The territorial context of Atena Lucana, with its distinctive characteristics, reflects many of the challenges faced by the Vallo di Diano area, where socio-economic vulnerabilities intertwine with the need for integrated regeneration processes. In this scenario, MTPLs serve as crucial methodological and operational tools to activate developmental dynamics that address the specific needs of the region, working to reduce gaps, overcome vulnerabilities, and promote equality-based policies. These efforts stem from direct interaction with the Archivio Atena project, an emblematic example of a community archive. This connection between laboratory methodology and local documentary heritage is key to understanding the innovative nature of these labs, which act as bridges between the collective memory of the region and its future prospects. Designed as interactive "platforms," these labs are not merely meeting places but co-design spaces that encourage the active participation

of all territorial stakeholders in a dialogical process aimed at building integrated strategies. Community archives, such as the Archivio Atena, are not merely collections of historical materials but cultural devices that preserve and narrate a community's experiences, traditions, and values. MTPLs play a strategic role in consolidating and reinterpreting the archive's heritage, leveraging it not only as an identity element but also as an operational tool to address contemporary challenges. Through a participatory approach, the lab activities integrate the region's historical and cultural knowledge with innovative and contemporary practices. In this way, the organized and documented collective memory within the archive becomes the starting point for defining interventions that strengthen social cohesion, enhance the region's adaptability, and generate new economic opportunities.

The MTPLs organized and planned in Atena Lucana aim to reduce socio-economic, cultural, and infrastructural gaps by building a network among cultural, economic, and social resources that would otherwise remain fragmented or underutilized. Documented memory helps identify and leverage the region's latent potential, such as its historical heritage, local traditions, and community skills.

Thus, MTPLs become spaces where past knowledge engages with the present to envision the future, functioning as multidisciplinary hubs where the community archive's knowledge is activated to generate innovative ideas and translate the region's potential into concrete actions. Through participatory workshops, expert meetings, and co-design activities, these labs reinterpret the region's memory and identity in a contemporary light. This process fosters projects related to urban regeneration, sustainable tourism, the promotion of local traditions, and the support of new forms of entrepreneurship rooted in the area's cultural and historical context.

For example, MTPLs have promoted economic regeneration initiatives through cultural tourism projects that merge historical documentation with contemporary experiences, generating economic opportunities for the community. Additionally, by digitizing and disseminating cultural heritage, the archive helps bridge knowledge gaps, ensuring cultural resources are accessible to a wider audience, including youth and schools.

Through MTPLs, major territorial vulnerabilities—such as depopulation, loss of collective memory, and weak economic and infrastructural fabric—are addressed not as isolated problems but as opportunities to strengthen the region's and its communities' capabilities. The archive becomes an empowerment tool, reinforcing the area's cultural identity, often threatened by marginalization. The historical memory preserved in documents and local narratives fosters a sense of belonging and social cohesion, reducing community isolation. Furthermore, the laboratory method supports the creation of new territorial governance tools, promoting integrated policies that address various vulnerabilities, from population aging to economic fragmentation. MTPLs also promote equality by directly involving the community in decision-making processes. The lab activities ensure that citizens actively participate in defining development priorities and strategies, overcoming disparities in representation and decision-making power. This helps bridge generational gaps, providing young people with tools and opportunities to connect with their region's roots and build future projects that respect its memory and identity.

2.6 Sant'Eusanio Forconese, Abruzzo. The reconstruction of the crater municipalities and the slow mobility

The Italian territory and its history are atavistically marked by risks, but above all the relationship between progress, design and risk finds specific conditions of existence. Moreover, the areas exposed to the greatest seismic risk in Italy are the Apennine mountains, which constitute a complex territorial system in which infrastructures and urban settlements, with varying degrees of density and intensity, define ever-changing conditions of coexistence with a topography that varies its characteristics throughout the entire peninsula. Over the last fifteen years, it is precisely along the Apennines that one can identify a trans-regional territory dramatically marked by seismic phenomena that with considerable continuity extends from Emilia Romagna to Lazio (Figure 29).

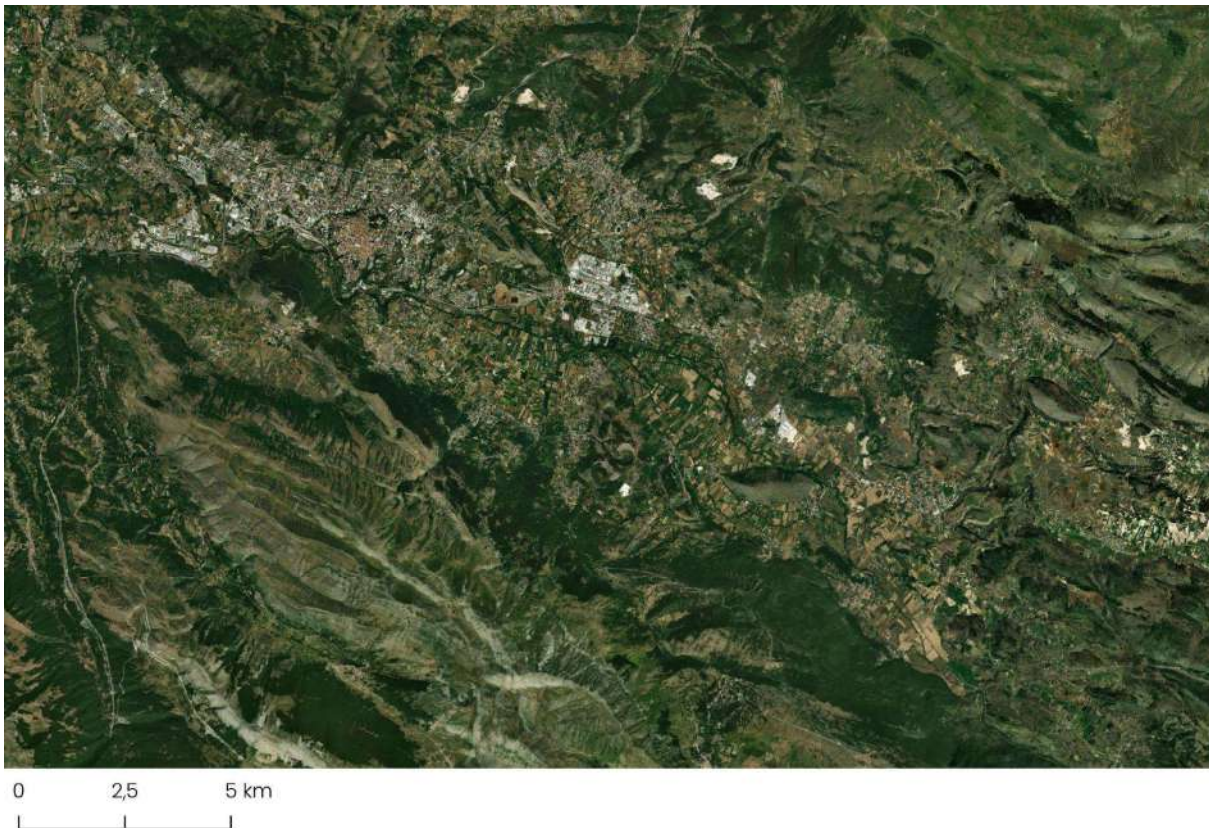


Figure 29: Satellite orthophoto of Sant'Eusanio Forconese and some municipalities of the seismic Crater of L'Aquila earthquake (2009).

Therefore, one of the case studies within the MTPL research activities conducted by the DiARC research unit is one of the villages affected by the 2009 earthquake; this temporal distance offers us the opportunity to deepen our understanding of the impacts of such

phenomena in terms of territorial sustainability. Among the 56 affected villages under the jurisdiction of the USRC (Ufficio Speciale per la Ricostruzione dei Comuni del Cratere), Sant'Eusanio Forconese (AQ) is continuing the reconstruction process, representing a good practice in terms of the percentage of private homes rebuilt.

Sant'Eusanio Forconese lies south-east of the city of L'Aquila, in the lower Aterno Valley. The historical core rises compactly around the main square in front of the Basilica of Sant'Eusanio Martire. The low hill relief on which the ancient village stands is not far from the Cerro mountain on which stands the castle-recinto that was one of the castles that participated in the foundation of the city of L'Aquila. Along the road leading from the foundation nucleus to the church of San Pietro near the castle, temporary residences were built following the earthquake that struck the centre.

The municipality of Sant'Eusanio Forconese is interesting primarily for two reasons. First, there is the unique relationship in terms of form and connections that exists between the building heritage under reconstruction and the temporary heritage that the municipality received after the 2009 earthquake. Second, it has a perceived sense of isolation despite its proximity to the urban center of L'Aquila, which the Special Office for the Reconstruction of the Cratere Municipalities is addressing through reactivation strategies focused on enhancing the historical and natural heritage rich in these landscapes (Figure 30).



Figure 30: The historical hamlet of Sant'Eusanio Forconese and the (con)temporary village.

2.6.1 Territories and specific areas

The municipality of Sant'Eusanio Forconese falls under the "Italy of Mezzo" category within the GRINS project's Taxonomy. Specifically, it is part of the Urban-Rural Continuum system and is classified as '2.1.1.1 - Urban-Rural Continuum of sparsely populated mountain/hilly areas'. One of the criteria used to construct this Taxonomy is the National Strategy for Inner Areas (SNAI) 2021-2027. According to this classification, Sant'Eusanio Forconese is part of the 'C - Belt' territorial system, being close to the core city of L'Aquila.

Despite this classification, the dynamics analyzed below indicate that Sant'Eusanio Forconese exhibits characteristics more akin to the Inner Italy (such as technological gaps, vulnerability in attracting funding, and significant demographic decline) than those associated with the Italy of Mezzo. The population trend series from 1951 to 2011 highlights similarities between Sant'Eusanio Forconese and Inner Italy, showing a sharp population decline until 1971. The population grew between 1871 and 1911, reaching a peak of 1,490 inhabitants. A significant decline occurred in 1931, with a -28.8% decrease. Similar trends were observed in the 1961 census, with a -28.9% drop compared to the previous decade when there were 920 residents, and again in 1971 with a -27.5% decrease, reaching 474 inhabitants. The decline continued in 2021, showing a -14% reduction. According to ISPRA data, in 2006, 3.63% of the territory was consumed, equivalent to 0.28 km². By 2022, land consumption slightly increased to 4%, representing 0.32 km². Agricultural land in Sant'Eusanio Forconese covers approximately 63% of the municipal territory. It decreased from 632 hectares in 1982 to 502 hectares in 2020, representing a decline of about -20.5%. This figure is below the provincial average, which recorded a decrease of approximately -35%. There are 13 agricultural enterprises in the area, compared to 110 in 1982, marking an 88% decline. The forested area is minimal, covering about 28 hectares (Figure 31).

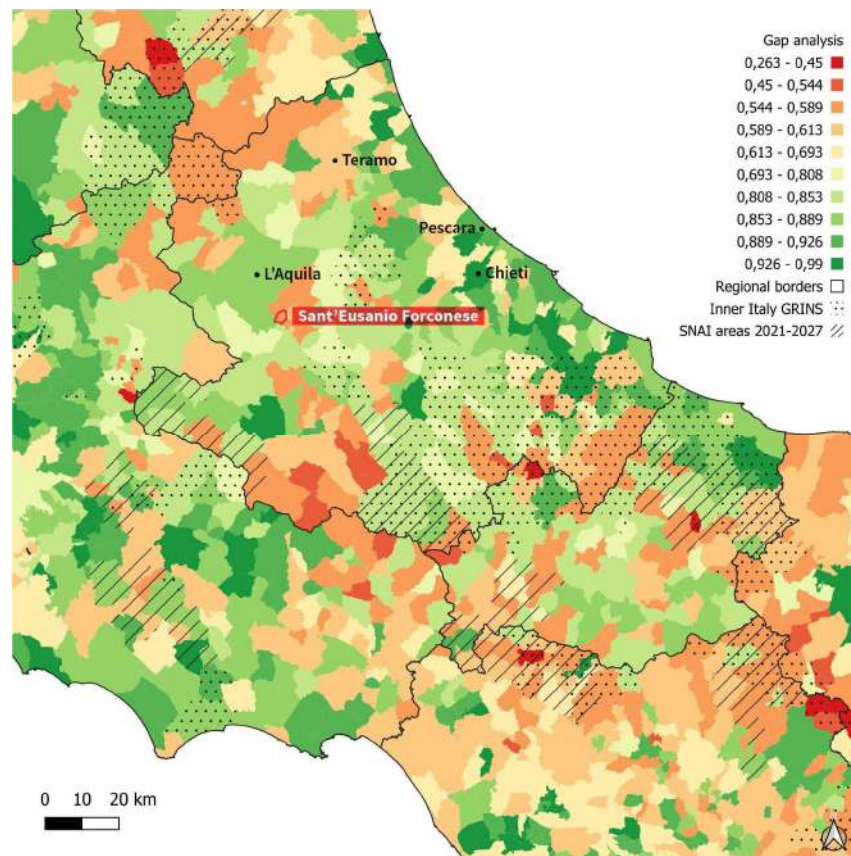


Figure 31: The gap analysis final assessment on the territory of Sant'Eusanio Forconese and the regional context.

The Gap Analysis, reviewed in Deliverable D7.3.3, examines disparities based on assessing territorial vulnerabilities outlined in Deliverable 3.2 'Interactive Maps on Local Vulnerability' and evaluated across three dimensions. In the social dimension, assessed through the indicators 'Vulnerability of accessibility to school offer' (MAP A.1) and 'Index of real estate abandonment due to lack of digital coverage' (MAP B.3), Sant'Eusanio Forconese falls within a low-medium range, indicating a distance from the optimal solution. This is due to an estimated medium-high vulnerability in the school accessibility system (A.1) and maximum vulnerability in indicator B.3, which analyzes the real estate from a digital coverage perspective. Based on the indicators 'Indicator of exposed buildings to landslide hazard at the municipal scale' (MAP D.1) and 'Indicator of exposed buildings to seismic hazard at the municipal scale' (MAP D.6), the economic dimension shows lower vulnerability. This is attributed to the lack of landslide exposure; however, the known seismic vulnerability places Sant'Eusanio Forconese at the highest level of risk. The agro-environmental dimension, analyzed through the indices 'Index of ecological transition of agricultural assets' (MAP C.1) and 'Sustainable agricultural index for water resources' (MAP C.2), places Sant'Eusanio Forconese in a low range. The considerable distance from the optimal point underscores the municipality's vulnerability in attracting funding, particularly in relation to the ecological transition. This is particularly notable regarding indicator C.2 (Figure 32).

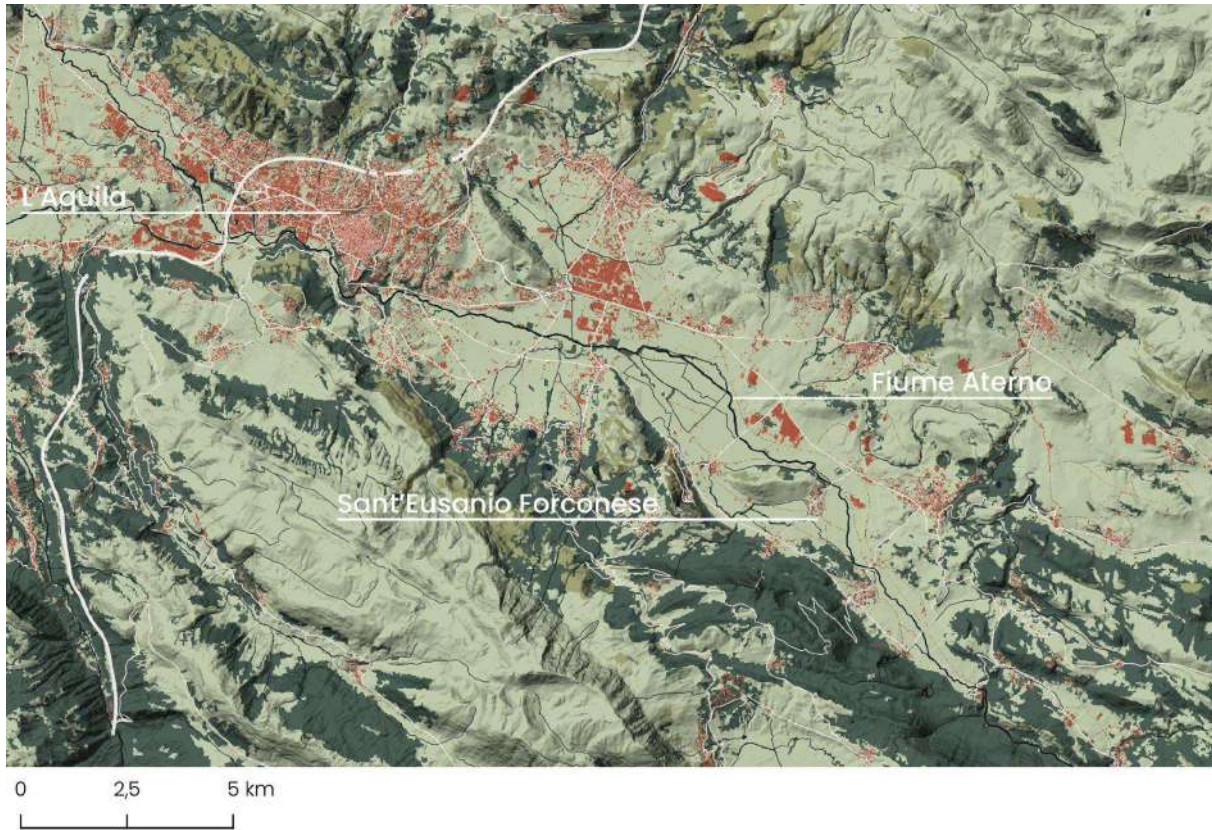


Figure 32: The central Apennine territory, crossed by Aterno River, with its peculiar orography marked by seismic risks. In this territory, small municipalities, among which there is Sant'Eusanio Forconese, revolve around the biggest centrality: L'Aquila.

2.6.2 Context and stakeholders

The MTPL's activities start in Sant'Eusanio Forconese, which is considered a representative case for Italian seismic history, a palimpsest of architecture and urban fabrics that have recorded the mutations caused by multiple seismic events over the centuries.

15 years after the disaster, the legacy of the 2009 earthquake is a largely rebuilt historic village, although the newly reconstructed facades almost always correspond to vacant housing. Indeed, the earthquake-related disaster is overlaid by the disaster of depopulation – which sometimes manifests itself in a high number of second homes. In addition, the site where the MAP (Moduli Abitativi Provvisori – Provisional Housing Modules) residences built after the disaster by the Civil Protection Department – an unavoidable stakeholder – are located in Sant'Eusanio Forconese is an alter ego to the “historical village-building site”. Temporary housing still remains, and represents a largely vacant public housing stock to be managed, which was added after the earthquake to the pre-existing housing stock, now under reconstruction. Therefore, the risks that the municipal administration of Sant'Eusanio Forconese – as well as those of the other villages in the earthquake crater – must face are evidently multiple and interlinked. For these reasons, it is precisely the mayor and the municipal administration that represent the main stakeholders, while the administrations of the neighboring municipalities represent potential stakeholders (Figures 33).



Figure 33.a: Educational and research activities at MAP village in Sant'Eusanio Forconese.

Figure 33.b: Public presentation of the ongoing activities at the Auditorium in University of L'Aquila.

Figure 33.c: Debate and exchange with USRC in Fossa.

Figure 33.d: A man born in Sant'Eusanio Forconese explaining the history of the fountain.

In fact, precisely because of the need to network between the different municipalities in order to define synergic projects, in addition to the municipal administration, a second stakeholder that has assumed great centrality in the initiatives conducted in the MTPL is the USRC. In fact, the general approach and procedures developed by the Special Office for the Reconstruction of the Crater Municipalities (USRC) are taken as good practice and case studies.

In addition to dealing with the management and monitoring of reconstruction processes, the work carried out by the USRC focuses on a broader idea of urban regeneration and territorial development, both for the enhancement of local resources and for the strengthening of communities and social relations. In fact, in contrast with the strong fragmentation of competences and intervention timeframes characterising the post-emergency period, the USRC is an innovative territorial actor that is experimenting with operational methods through which to build bridges with possible future scenarios of territorial sustainability. The innovative experimentation that the USRC is conducting is rooted in the desire and effort to look at the end of reconstructive processes by trying to interpret with a systemic approach the multiple crises that the territories in which it operates are going through. In this framework, a major topic for the development proposed by USRC is slow mobility and overall the valorization of a system of pathways crossing the region.

Entity/association/ organization name	Domain	Expertise
UNINA DiARC	Research	Transversal
UNINA DICEA	Research	Transversal
UNIVAQ	Research	Transversal
TEMP- network	Research	Transversal
ENSA PARIS BELLEVILLE	Research	Transversal
POLIMI	Research	Transversal
POLITO	Research	Transversal
UNICAM	Research	Transversal
Centro Studi PLINIVS	Research	Transversal
Comune di Sant'Eusanio Forconese	Policy	Transversal
Regione Abruzzo	Policy	Transversal
Dipartimento della Protezione Civile	Policy	Transversal
Ufficio Speciale Ricostruzione Comuni del Cratere	Policy	Transversal
VIVIAMOLAq	Public/user	Transversal

Table 5: Stakeholder Map

2.6.3 Methodologies and actions

The MTPL in Sant'Eusanio Forconese began with research work focusing, on the one hand, on the Reconstruction Plan and, on the other, on the transformations that followed the 2009 earthquake. The study of the urban layout prior to the calamitous phenomenon and the one immediately following is fundamental for understanding both the processes underway and the possible directions of development for the village.

The 'background' phase was started by a doctoral research carried out by a member of the research group who had already verified the significance of the Sant'Eusanio Forconese territory with respect to the theme of risks, particularly seismic risks, and the impacts they generate in terms of territorial sustainability. The question that was at the heart of the MTPL's activities and that triggered the transition to the 'common ground' phase was: 'rebuild, for whom? How to identify intermediate solutions between the extremes of "host town" and "ghost town"?'.

In the first phase, the MTPL's actions were based on a specific interest of the municipal administration about the possible transformative strategies of a site where a former school and kindergarten are planned to be demolished and rebuilt. Thus, the first 'common ground' phase involved the synergy between architects and engineers called to interact with the municipal administration, local designers and representatives of the USRC. In this phase, valuable support was provided by local scholars and sociologists who were able to share their knowledge of the dynamics of marginalisation and re-appropriation that occurred in the post-earthquake period.

The most relevant teaching and in-field research activity was carried out at Sant'Eusanio Forconese from 20 to 25 November 2023 during the workshop 'Intervenir dans un territoire

à risque: vulnérabilités, enjeux, opportunités' organised with the École nationale supérieure d'architecture de Paris-Belleville. In this 'landing' phase, the actions conducted were material and structural surveys, photographic and historiographical investigations and also semi-structured interviews that also led to the elaboration of artworks and performances. The collection of quantitative and qualitative data was fundamental to the design proposals that were subsequently put forward. The development trajectories identified were very varied and fuelled the 'interacting' phase. Students from the Department of Architecture of UNINA and the DSA Architecture et Risques Majeures of ENSPAB elaborated design visions on the basis of the materials and data acquired and then presented the projects to the institutions and the community, opening an important debate on the development potential of the municipality of Sant'Eusanio Forconese. All the proposals interpreted the hamlet in relation to the network of municipalities of the seismic crater with reference to the strategies set up by the USRC; this therefore oriented towards a systemic vision of the territory based on multiple temporalities and above all in reference to multiple types of inhabitants. Therefore, the infrastructures for slow mobility that were interpreted in the MTPL were recognised as an asset to be placed at the centre of all design processes because they are necessary for both permanent and temporary inhabitants (as well as tourists).

Following this process of knowledge valorisation, from the 'interacting' phase, we moved back to 'background' as the MTPL focused on the relationship between urban forms and communities. So in the ongoing 'common ground' phase, we are trying to understand how the relationship between physical reconstruction and social reconstruction can be interpreted. Thus the first action that will certainly be required is a deep knowledge of the real estate and its state of preservation and use. The state of preservation and use of both the reconstructed (or under reconstruction) heritage and the temporary buildings built in 2009 will have to be verified. This is to confirm the necessary synergy between the two main supra-municipal stakeholders that are the Civil Protection Department and the Special Office for the Reconstruction of the Crater Municipalities. In fact, it is only on the basis of this pre-knowledge that surveys and interviews can be conducted to understand the demands and expectations of the inhabitants (Figure 34).



SÉMINAIRES INTERMÉDIAIRES
21 | 11 | 23 - 24 | 11 | 23
SANT'EUSANIO FORCONESE

21 | 11 | 23
Camillo BOANO | 13:00

22 | 11 | 23
Ufficio Speciale Ricostruzione
Comuni del Cratere | 10:00

23 | 11 | 23
Alessandro CHIAPPANUVOLI | 15:00
AVEC TRANSLATION

24 | 11 | 23
Giulia DE CUNTO | 16:00

SÉMINAIRE FINAL ET EXPOSITION PÉDAGOGIQUE
25 | 11 | 23
L'AQUILA | Università degli Studi dell'Aquila | Dipartimento di Scienze Umane | viale Nizza - 14 | Aula Magna

Gianni DI GIOVANNI | 10:00
Università degli Studi dell'Aquila
AVEC TRANSLATION

Étudiants.es du DSA Architectures et Risques majeurs
ENSA Paris-Belleville
Étudiants.es du Laboratoire di Progettazione 4D
Università degli Studi di Napoli Federico II

Sarra KASRI - Cyrille HANAPPE - François POUBEAU
ENSA Paris-Belleville
Angela D'AGOSTINO - Giovangiuseppe VANNELLI - Piero ZIZZANIA
Università degli Studi di Napoli Federico II
Lina Maria CALANDRA - Gianni DI GIOVANNI
Università degli Studi dell'Aquila
Luigi COCCIA
Università di Camerino

Lina Maria CALANDRA | 12:00
Università degli Studi dell'Aquila
AVEC TRANSLATION

Luigi COCCIA | 12:45
Università di Camerino
AVEC TRANSLATION

SANT'EUSANIO FORCONESE WORKSHOP
**Intervenir dans un territoire à risque:
vulnérabilités, enjeux, opportunités**
20 | 11 | 23 - 25 | 11 | 23

Sarra KASRI
Enseignante au DSA Architectures et Risques majeurs | ENSA Paris-Belleville
Responsable du workshop

Cyrille HANAPPE
Enseignant au DSA Architectures et Risques majeurs | ENSA Paris-Belleville
Directeur pédagogique du DSA ARM

Giovangiuseppe VANNELLI
Chercheur au Département d'Architecture | Université de Naples Federico II
Organisation du workshop

François POUBEAU
Intervenant invité - Encadrement artistique

Organisé par
école nationale supérieure d'architecture de paris-belleville

partenaires:
AFPCNT
UNIVERSITÀ DEGLI STUDI DELL'AQUILA

Figure 34: Manifesto and agenda of the International workshop "Intervenir dans un territoire à risque: vulnérabilités, enjeux, opportunités" organised with DSA Architecture et Risques Majeurs (ENSAPB).

In this direction, a further 'landing' phase is planned for spring 2025 and will also be conducted during a Blended Intensive Programme, since it has been verified that collaboration with international partners returns greater richness to both the production and sharing of knowledge, both of which are absolutely central operations for the MTPL.

2.6.4 Aims and impacts towards design of area-specific strategies for gap/vulnerability reduction and equalization policies

In this scenario, the MTPL assumes a crucial role in investigating - with workshops in-lab and field experiments - the possible strategies to reduce the deep vulnerabilities that characterise these territories. The new visions for the future of these places, enabled by a multidisciplinary approach, must therefore involve multiple stakeholders and confront existing projects in order to reverse the processes of marginalisation, depopulation and impoverishment - both material and immaterial - and trigger a rethinking about inhabiting these territories, managing to live with risk.

In Sant'Eusanio Forconese, the main objective of the MTPL is to bring together plural competences, visions and ideas, defining a territorial network that goes beyond the municipal borders. The workshops can represent a moment of knowledge valorization and an opportunity to test and open visions oriented to multiple types of inhabitants, new forms of production and different ways for crossing the landscape between the multiple fragments of heritage belonging to different historical phases. It seems to be necessary to reconsider the residential stock - both the historical and the temporary one - as a whole with the aim of defining a synergic scenario in which the crater municipalities could interact through multiple networks based on local resources.

In conclusion, the MTPL will investigate new possible coexistences between temporary and permanent inhabitants, and between material and immaterial resources.

2.7 Borghi IN network in inner Abruzzo: innovative and cooperative solutions in accessing local services and mobility

The region of Abruzzo, located in central Italy, includes rugged mountains e.g., Gran Sasso, and vast rural areas which play a crucial role in both the region's cultural heritage and its economic activities

Approximately 50% of the region's territory is designated as protected land, encompassing three national parks, one regional park, and 38 nature reserves. These areas provide significant opportunities for outdoor activities such as hiking, skiing, and wildlife observation. The population density in Abruzzo is 120 inhabitants/km² (Rural Observatory, 2020).

In the mountainous interior, numerous small villages and hamlets preserve historical assets, including castles, hermitages, abbey sanctuaries, and ancient churches. At the same time the inner areas of the region face important socio-economic issues i.e., aging populations, migration of youth, and rural-urban migration are major concerns, as younger generations leave for larger cities in search of education and job opportunities. Meanwhile, local economies rely heavily on small family-run businesses and agriculture, which is often practiced in a traditional and resource-intensive manner. These industries face increasing pressures from both climate change and the evolving agricultural policies (Figure 35).

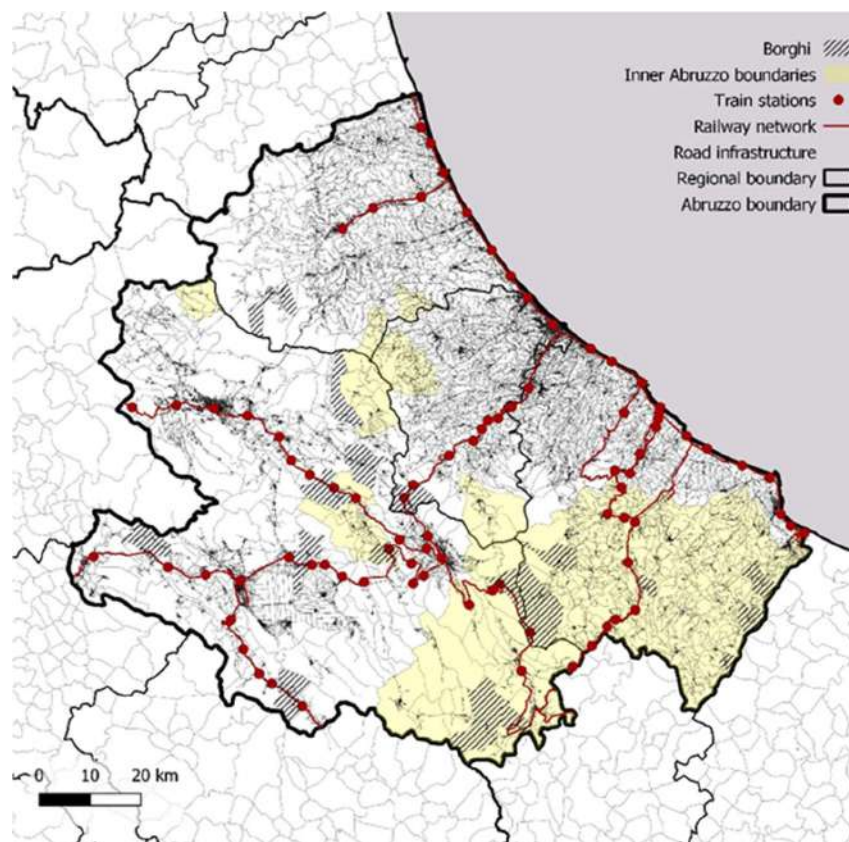


Figure 35: Road and railway infrastructure in Abruzzo, inner areas highlighted in yellow.

In terms of transport infrastructures, both road and railway networks are dense in the coastal and central areas of Abruzzo, with numerous train stations concentrated along these corridors. However, the inner Abruzzo areas have sparse railway connectivity. Many villages and inner centres are far from the railway stations, which poses challenges for accessibility and connectivity. While the road network is relatively extensive, the quality and resilience of these roads in remote or mountainous areas are uncertain, which may exacerbate issues of isolation. Hence, this reliance on roads, without sufficient railway alternatives, limits sustainable transport options and increases vulnerability to disruptions caused by natural disasters or poor maintenance.

Following the results of vulnerability and gap analysis, two topics are defined to go further in the specific territories i.e., accessibility to services (educational –primary and secondary schools–, health facilities, train station) and digital connectivity (both fixed and mobile network).

In healthcare, Abruzzo's inner areas face notable disparities, with average distances to facilities (22.47 km) similar to the national inner-area average but higher than Abruzzo overall. This suggests challenges in service accessibility for rural residents. For education, the inner areas of Abruzzo have considerable gaps, particularly for secondary schools, where the average distance (28.77 km) far exceeds the national inner-area average of 22.74 km. In contrast, the more urbanized parts of Abruzzo typically have better access to these services, showcasing a divide within the region.

Access to transportation is another key area of concern. Inner areas in Abruzzo average 28.58 km to train stations, aligning with the national inner-area average but significantly higher than the overall distances seen in Abruzzo's urbanized parts. This emphasizes the geographic and infrastructural barriers that isolate the inner areas.

Digital infrastructure presents a mixed picture. Abruzzo's inner areas outperform many other inner regions in Italy with fixed broadband speeds of 7270 Mbps, far above the national inner-area average of 5332 Mbps. However, mobile broadband speeds lag behind the national average, highlighting a gap in mobile connectivity. In contrast, urban areas in Abruzzo benefit from more consistent and robust digital infrastructure.

It is notable that much focus has been laid on multimodal mobility, though with glaring gaps. This is due to perceived limited attention to accessibility for people with disabilities and last-mile connectivity in underserved or rural areas, which are very important in making access equitable. Strategies for behavioral and cultural change-like public awareness campaigns or incentives to shift people's preferences toward sustainable modes of transport-are not addressed. While it is laudatory to support zero-emission buses and hydrogen infrastructure, the absence of interoperability standards and a number of practical challenges to implement the technology in question, especially in remote areas, seriously questions its effectiveness. Adaptation to climate change in transport resilience remains vague without clear approaches toward decarbonization in freight transport and enabling disaster preparedness through design. Finally, the absence of robust funding mechanisms and resource allocation strategies with equity in mind might impede the realization of these initiatives' full implementation and inclusiveness.

On the other hand, the policy framework on local services and wellness improvement has the second relevant need identified. Although these rules support eco-sustainable practices and community cooperatives, not much is done to guarantee their long-term

viability or how they may compete in the market. There are minimal systems for accountability and oversight, and coordination between institutional, private, and community-based players is lacking. Issues of social fairness, such as the need to address systemic injustices and modify programs to accommodate diverse demographic groups like the elderly or underprivileged neighborhoods, are not taken into account. The digital divide and the necessity of digital literacy initiatives are entirely ignored when discussing broadband connectivity. Large areas of wellness go unchecked when preventive healthcare measures and mental health support are excluded from larger health initiatives. Furthermore, several broader environmental determinants of health, such as housing quality and green space, are absent from the strategy. This alone is regarded as a drawback for the approach's comprehensiveness.

2.7.1 Territories and specific areas

Starting from this general framework, the case study identified covers a cluster of municipalities dispersed in the mountainous areas of Abruzzo, most of which are included in the inner areas' perimeter (Figure 36).



Figure 36: The municipalities involved by Borghi IN network

The peculiarity of this cluster lies in the fact that they are part of the 'Borghi IN Network' an

initiative supported by Confcooperative Nazionale and promoted and coordinated in Abruzzo by Confcooperative Abruzzo. This initiative aims to achieve significant outcomes through collaborative efforts. Therefore, even though they are dispersed and apparently not included into a continuous territorial system they represent a cohesive system of places that exchange services. Indeed, the network is composed of some municipalities in Abruzzo that have chosen to address the issues of depopulation and abandonment through a new form of enterprise: the community cooperative. Community cooperatives are established by the residents of a specific area, who come together to create and develop projects spanning various sectors to enhance the economic and social well-being of the community, create job opportunities, and safeguard the cultural heritage of the villages. Some municipalities involved in the Borghi IN network, including both the mountainous zones and smaller rural municipalities, are especially vulnerable to depopulation and economic stagnation. These areas typically rely on traditional industries, particularly agriculture and tourism, but face challenges such as limited infrastructure, underdeveloped local services, and difficulty attracting investment. The region's landscape and biodiversity offer potential for sustainable development, particularly in sectors like nature-based tourism and sustainable agrifood systems.

If we consider the situation of accessibility to the services and digital connectivity in the municipalities included in the network, emerging from the data used for the gap analysis and the vulnerability maps, variable trends can be underlined.

The following maps show the average distances to primary and secondary schools respectively. Hatched areas represent the municipalities within the Borghi IN network and some of them are caught inside the inner area of Abruzzo (Figure 37).

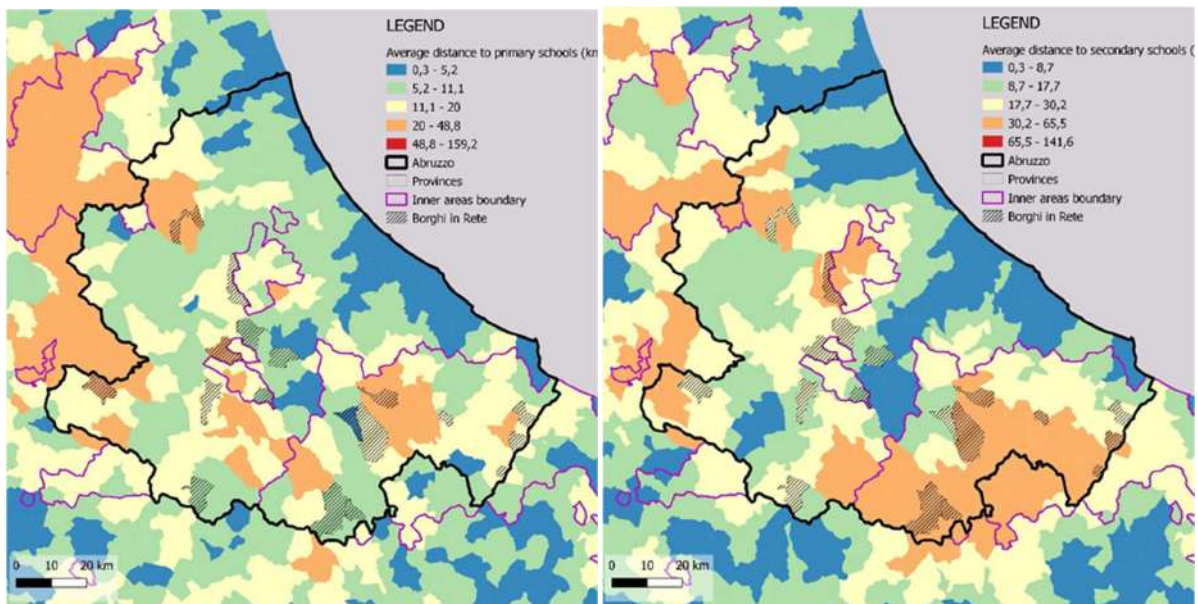


Figure 37: Figure (a) Average distance to primary schools (km), (b) Average distance to secondary schools (km)

On one hand, these municipalities highlight a remarkable variation in terms of distance to primary school. In particular, fall within blue and green zones, hence, shorter distances are

outlined, between 0.3 and 11.1 km, assuming better proximity to local village schools. However, many other Borghi lie in the orange zones, where the distances exceed more than 20 km. It highlights inequalities in primary school access, where some villages have huge challenges in allowing their children to attend school.

On the other hand, the secondary school access represents an even greater challenge for Borghi in inner Abruzzo as they mostly fall into orange and red zones, where travel distances to secondary schools are above 30 km. Secondary schools are fewer and more centralized, normally located in larger towns, which makes them less accessible for these villages. This creates a real barrier to education for older children, especially in cases where families do not have any means of transport (Figure 38).

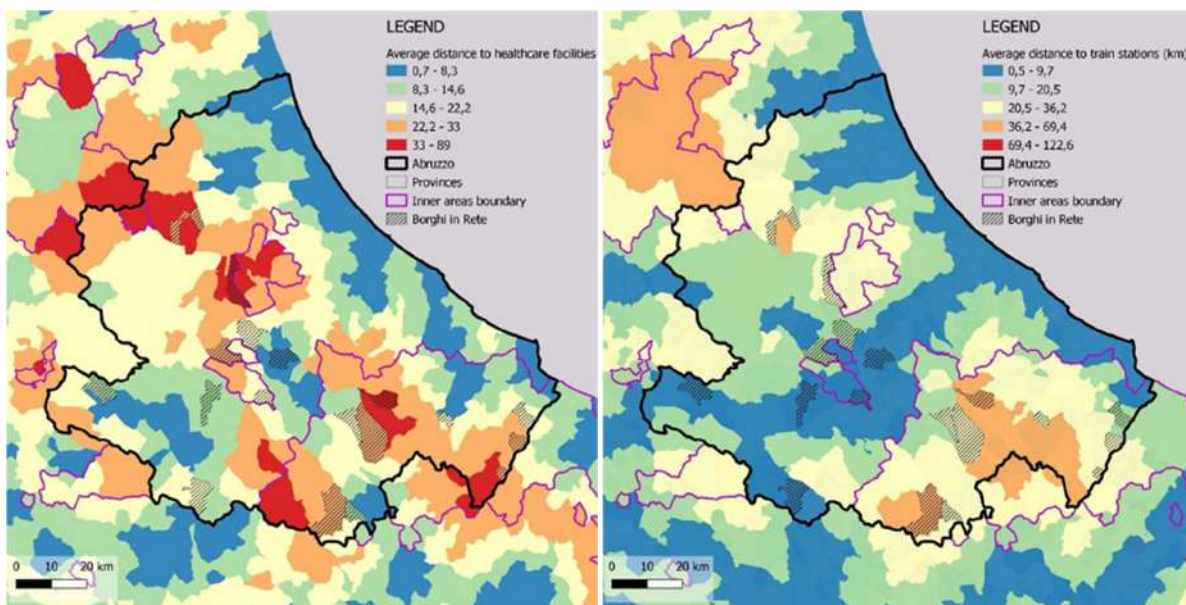


Figure 38: Figure (a) Average distance to healthcare facilities (km), (b) Average distance to train stations (km)

The Borghi in the inner Abruzzo areas exhibit significant disparities in accessibility to healthcare facilities. Some Borghi fall in blue and green zones (distances between 0.7 and 14.6 km), indicating relatively better access to healthcare services. However, a notable number of Borghi are situated in orange, even red (distances over 22 km, with some exceeding 33 km), highlighting significant gaps in healthcare accessibility.

The long travel distances to healthcare facilities pose serious challenges for vulnerable groups such as the elderly, individuals with chronic conditions, or those requiring regular medical care. In emergencies, the lack of nearby healthcare facilities increases the risk of delayed treatment, further exacerbating inequalities in health outcomes.

The Borghi in the inner areas show mixed accessibility to train stations. The Borghi in inner areas are located in orange zones, where distances exceed 36 km, highlighting significant challenges in accessing train stations. This is particularly evident in the southern and southeastern parts of the inner areas (Figure 39).

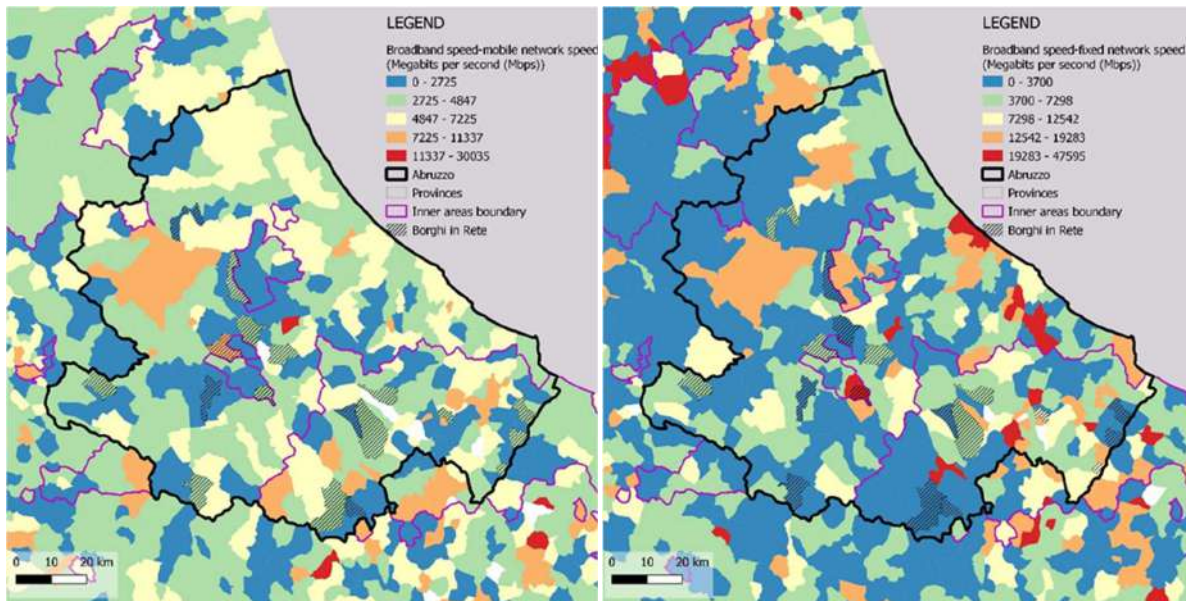


Figure 39: Figure (a) Broadband speed network (mobile) (Mbps), (b) Broadband speed network (Fixed) (Mbps)

Many areas are located in blue and green zones (speeds between 0–7,225 Mbps) for mobile broadband speed, indicating low-to-moderate mobile network speeds. Few Borghi achieve speeds in the orange zones (above 7,225 Mbps), and these tend to be exceptions near main transportation routes or larger towns.

Regarding fixed broadband speed, many Borghi in inner Abruzzo areas fall within blue zones (speeds between 0–3,700 Mbps), indicating low-speed connectivity. A few Borghi are in green zones (3,700–12,542 Mbps), suggesting moderate speeds, but these are exceptions rather than the norm. Areas marked in orange and red (above 12,542 Mbps) are concentrated closer to urbanized regions, emphasizing a significant connectivity gap for Borghi in rural and mountainous areas.

Inner Abruzzo areas, particularly in the southern and central zones, experience the lowest speeds for fixed broadband. This contrasts starkly with better-connected coastal and provincial regions, highlighting the digital divide.

Mobile broadband access appears slightly better distributed than fixed networks in inner Abruzzo areas.

2.7.2 Context and stakeholders

The Borghi IN Network was created to establish a working system that fosters synergy among all the community cooperatives within it. The network's goal is to develop a self-sustaining model for the growth of fragile local economies, one that can deliver economic and social well-being to the area by creating new jobs and enhancing the territory's value. Community cooperatives work individually to address local needs while also collaborating with other cooperatives on broader, more structured projects coordinated by Confcooperative Abruzzo.

In this context, and driven by this objective, the network has already begun collaborating

with UNIBO on a research project called RURAACTIVE, financed by the Horizon Europe research programme where part of this network of villages is involved in a co-design process to promote community-based action for strong, connected, resilient and prosperous rural societies.



Figure 40: Figure Open day in 12-14 July, 2024, in Aielli (AQ)

According to the methodology outlined in Section 1.3.5, a series of workshops and public meetings were organized in this case study to establish the MTPL and begin collaborative work. A public event to launch the activities was held in July 2024 in Aielli (AQ), where UNIBO and representatives of the Borghi IN network presented their intention to collaborate and develop solutions aimed at achieving significant goals for the entire rural area involved, in close partnership with the local community (Figure 40). Another meeting was held in September 2024 in Navelli (AQ) where a shared vision among local stakeholders on the main challenges of their community emerged. Among the challenges discussed, two of the most relevant ones were improving sustainable multimodal mobility and local services and wellbeing.

The work already done with this community of villages in Abruzzo and especially with Borghi IN has already contributed to establishing a strong MTPL that may constitute a fertile environment where to co-create shared visions and solutions for reducing territorial gaps. Moreover, the challenges that emerged make this case study very interesting for being further investigated also under the GRINS perspective.

After these preliminary results, UNIBO initiated discussions with representatives of this case study (i.e., the University of Chieti-Pescara) to explore potential key challenges where

members of the MTPL could be involved, and to establish new areas of collaboration, which will be further defined in the coming year. The aim is to go in continuity with the MTPL already established to instill the GRINS approach and knowledge and create more solutions and ideas for reducing territorial disparities already generated. The two initiatives are highly aligned in terms of goals and topics, making this continuation of scope easy to pursue. After the experience already conducted with the municipalities included in the network, we are expecting to be able to work with a series of stakeholders that represent different domains and target audiences:

- Local municipalities and regional government;
- Agricultural producers;
- Cultural and environmental NGOs;
- Local businesses and cooperatives;
- Youth organizations;
- Vulnerable and underrepresented groups.

A complete list of stakeholders already engaged that can be considered is listed in the table below with their domains and expertise.

Entity/association/ organization name	Domain	Expertise
*Tua Abruzzo	Industry/services/investors	Sustainable multimodal mobility
**Fondazione carispaq	Policy	Culture and cultural innovation
GAL Marsica	Policy	Transversal
Associazioni Medici di Famiglia	Public/user	Local services, health and wellbeing
Parco Nazionale della Maiella	Industry/services/investors	Transversal
Parco Regionale Sirente Velino	Industry/services/investors	Transversal
Parco Nazionale d'Abruzzo, Lazio e Molise	Industry/services/investors	Transversal
Slow Food Abruzzo	Public/user	Sustainable agrifood systems and ecosystem management
GAL Gran Sasso	Policy	Transversal
Local Pharmacies	Industry/services/investors	Local services, health and wellbeing
RFI	Industry/services/investors	Sustainable multimodal mobility
Trenitalia – Abruzzo Regional Direction	Industry/services/investors	Sustainable multimodal mobility
Assicurazione Unipol	Industry/services/investors	Sustainable multimodal mobility
Confcooperative Abruzzo	Policy	Transversal
Fiab Pescarabici	Public/user	Sustainable multimodal mobility
***Appennini For All	Public/user	Culture and cultural innovation
***ANFFAS	Public/user	Local services, health and wellbeing
Legambiente Abruzzo	Public/user	Sustainable multimodal mobility
Associazione torre delle stelle Aielli	Public/user	Culture and cultural innovation
Associazione Cuore dei confini	Public/user	Culture and cultural innovation
APS Barrea	Public/user	Culture and cultural innovation
Soprintendenza Archeologica Belle Arti e Paesaggio	Policy	Culture and cultural innovation
Università dell'Aquila	Research	Transversal
Università di Teramo	Research	Transversal
Università Chieti – Pescara	Research	Transversal
Italia nostra	Public/user	Culture and cultural innovation
Borghi Autentici	Industry/services/investors	Culture and cultural innovation
Movimento Zoe (valle peligna)	Public/user	Culture and cultural innovation
Bradamante teatro	Public/user	Culture and cultural innovation
Bike for fun (popoli)	Public/user	Sustainable multimodal mobility
Covalpa (Aielli)	Public/user	Sustainable agrifood systems and ecosystem management
Cooperativa zafferano navelli(navelli)	Public/user	Sustainable agrifood systems and ecosystem management
Associazione università tartufo	Public/user	Sustainable agrifood systems and ecosystem management
**Cooperativa OSA – Operatori Sanitari Associati	Industry/services/investors	Local services, health and wellbeing

Entity/association/organization name	Domain	Expertise
***Cooperativa Horizon	Industry/services/investors	Local services, health and wellbeing
Rete portinerie di comunità	Public/user	Culture and cultural innovation
IOT	Research	Local services, health and wellbeing
CNR Ispc - Roma	Research	Transversal

Table 6: Stakeholder Map

Groups at risk of exclusion and under-representation: *young people; **older people, ***people with disabilities.

2.7.3 Methodologies and actions

The MTPL created for the RURACTIVE project is a good starting point for building a new panel of stakeholders that can be interested in developing specific actions in the framework of GRINS. The methodology that we would adopt will follow the main stages already described in Section 1.3.5, presumably undertaking an in-field experiment. The main actions that we expect to take are described below.

Getting started: The first stage will be to present and discuss in detail the GRINS outcomes concerning gap and vulnerability analysis results to the community leaders, identifying specific needs that can be further investigated in GRINS.

Stakeholder Identification and engagement: After identifying the most relevant territorial challenges, ambitions and geographies of the rural ecosystem, the following stage will be determining the key stakeholders to involve in the discussion and definition of the real needs, interests and concrete actions to undertake. The open event and workshops already run were very useful in consolidating an interest in acting for improving the living condition of the area involved (Figure 41).



Figure 41: Manifesto and agenda of the kick-off event in Aielli (AQ)

Identifying Vision and Challenges: Based on the feedback received, a more detailed analysis of the different territorial frameworks and geographies of stakeholders in the network will be done, along with the collection and analysis of relevant policies. The aim is to identify local gaps not only in terms of accessibility and local services but also in terms of policies and data availability, that can be considered as a pre-requirement for designing credible and effective solutions.

Defining possible solutions: This phase is dedicated to identifying, tailoring and developing potential new solutions to tackle challenges and needs already identified. The expected solutions can range from improvement of data in order to better orient the decision-making process to design of territorial strategies to new or updated policies that can be influenced. Consequently, these solutions can be implemented in practice if the conditions are favorable.

During the local workshops already run by the MTPL, some challenges emerged as well as key area-specific strategies focused on the problems related to Mobility and Local Services. Below are the items identified by the stakeholders involved in the MTPL per each topic:

- Sustainable multimodal mobility

- improving transportation networks, broadband connectivity, and public facilities
- enhance sustainable mobility and air quality
- promotion of bicycle mobility, zero-emission buses, both electric and hydrogen
- creation of an interchange network between trains, buses, cars, and bicycles
- ensure that the transportation system can continue to function effectively under changing climate conditions and natural disasters
- Local services, health and wellbeing
 - improving its quality of life through the development of eco-sustainable economic activities and the creation of job opportunities
 - support the establishment of Community Cooperatives
 - mobilize resources to enhance services, infrastructure, and economic prospects
 - resources for healthcare, education, and social inclusion programs
 - improving health and social care and supporting vulnerable groups
 - interactions and relationships between institutional actors, professionals, the third sector, and citizens

The panel of stakeholders involved identified other possible actions that can be taken into account for future developments. They are related to other two challenges and the most relevant for GRINS are the following.

- Culture and cultural innovation
 - strategies for the promotion, training and development of tourism resources
 - coordinated and integrated promotion actions across the territory
 - promoting cultural exchange and innovation
 - contribute to the economic well-being of the region while preserving its natural and cultural heritage
- Sustainable agri-food and ecosystem management
 - enhance agricultural productivity
 - preserve natural resources
 - promote diversification in rural economies
 - facilitate the entry and retention of young and qualified entrepreneurs in agricultural, forestry, and non-agricultural businesses
 - emphasize practices that enhance environmental well-being
 - encourage practices such as organic farming, crop diversification, and reduced use of chemical inputs
 - recover, conserve, characterize, and promote diverse crops and livestock breeds

2.7.4 Aims and impacts towards design of area-specific strategies for gap/vulnerability reduction and equalization policies

The challenges and the set of actions already identified will be considered as a foundation for co-designing solutions that can be applied to the study area in Abruzzo, giving the flavor of possible directions that can be taken by the local community of stakeholders.

By considering what emerged and the level of engagement of local stakeholders we expect at least to continue the discussion with a selected group of stakeholders in order to better

define their needs and the policy framework that should be influenced at the different scales in order to produce policy changes that can have an impact on a wider territory. The role of GRINS will be to orient the decision-making process toward those actions that might be more coherent with the need of increasing the knowledge of the local territorial frameworks and reducing local gaps and vulnerabilities.

2.8 The role of rail transport in reducing the negative externalities of logistics within the city-port relationship: the case of Adriafer and the port of Trieste

The analysis proposes to explore the specific role of railway handling to and from the port of Trieste. In recent years, this seaport has seen unprecedented growth in the movement of goods by rail. The modal shift represents one of the best solutions to reduce emissions associated with the logistic systems, resulting above all from the fact that once on the electrified rail network, direct emissions from this mode of transport will drop to zero. To capitalize on this, ports are promoting a transition from road to rail transport in hinterland areas. This strategy not only helps mitigate truck-related port congestion but also facilitates the development of green corridors linking ports to major rail hubs. A well-equipped, low-emission port can significantly enhance efficiency, with a single train capable of replacing the load capacity of fifty trucks.

In order to implement this modal shift strategy, the port of Trieste has established an in-house company called Adriafer, the exclusive railway shunting company of the Port of Trieste. This is called upon to perform all railway traction operations in port contexts with significant consequences in terms of mitigating negative externalities on urban scale.

2.8.1 *Territories and specific areas*

This report is aimed at analyzing the dynamics of rail transport in transit through the port of Trieste towards the hinterland and also in relation to the port-city dynamics. The systemic drive to prefer the railway mode for the movement of traffic towards the port hinterland is due as much to competitive cost advantages as to the desire to reduce greenhouse gas emissions generated at the port, road congestion, and the presence of particulate matter and other pollutants in the air generated by the presence of a high number of truck on the roads.

The combination of all these factors, aided by an extremely efficient rail transport infrastructure, has enabled the Port of Trieste to adopt a strategy aimed at exploiting this mode of transport as much as possible, cutting the number of lorries on the roads by over 350. 000 units, directly linking maritime and land flows towards a combination of different transport modes.



Figure 42 - The Rail connection of the Port of Trieste – Source: https://www.porto.trieste.it/wp-content/uploads/2022/05/Relazione_funzionamento_complessivo_2021_FINAL.pdf

2.8.2 Context and stakeholders

Adriafer is a 100% owned subsidiary of the Port Network Authority of the Eastern Adriatic Sea specialising in the shunting and traction of railway convoys, both incoming and outgoing, within the Enlarged Port District of the Port of Trieste. As the unique Manager of railway shunting in the port area, Adriafer plays a crucial role in the logistics chain centred on the Port, connecting the national railway network managed by RFI to the port terminals. Trieste, in fact, is the most important railway port in Southern Europe, equipped with 70 km of tracks serving all the piers and making it possible to compose trains directly at the terminals.

Adriafer's activity within the District and on the tracks of the railway stations (LDS), managed by RFI, has represented a real turning point for the entire Regional Logistics System, leading to an increase in the potential of the service that can be provided by trains and a reduction in the time required for rail transport, thus leading to a reduction in costs and transit times that have made Trieste a best practice for the modal transition from road to rail. During 2022, in fact, the number of trains moved was 9,536 from about 6,000 in 2015 within the Port District alone, a number that increases to over 11,000 trains if one widens the view to the port of Monfalcone (also under the control of the Trieste Port Authority), for a total of over 230 trains per week. The area of interest for the Regional Logistics System, it should be underlined, also extends outside the Free Port of Trieste, widening to the back-port areas of Aquilinia, Servola, up to the Italian-Slovenian border at Villa Opicina and the regional freight villages of Ferneti, Cervignano and Gorizia. It is precisely with a view to optimising the port

network for the benefit of the various district operators that Adriafer has started to operate on the mainline on short-haul routes. Operations on these routes have been carried out since September 2017, the year in which the National Agency for Railway Safety (ANSFISA) granted the company the Single Safety Certificate to operate the first mainline trains, with the aim of creating a synergic system and improving the competitiveness of the Port System.

The Port of Trieste represents an important link between the Mediterranean and the Adriatic Baltic European Corridors, as it is a strategic hub for the flow of goods between the markets of Central and Eastern Europe and the Mediterranean basin.



Figure 43 – Railway infrastructure in the port of Trieste: Station and shunting area of Campo Marzio – Source: Elaboration of Professor Giuseppe Borruso

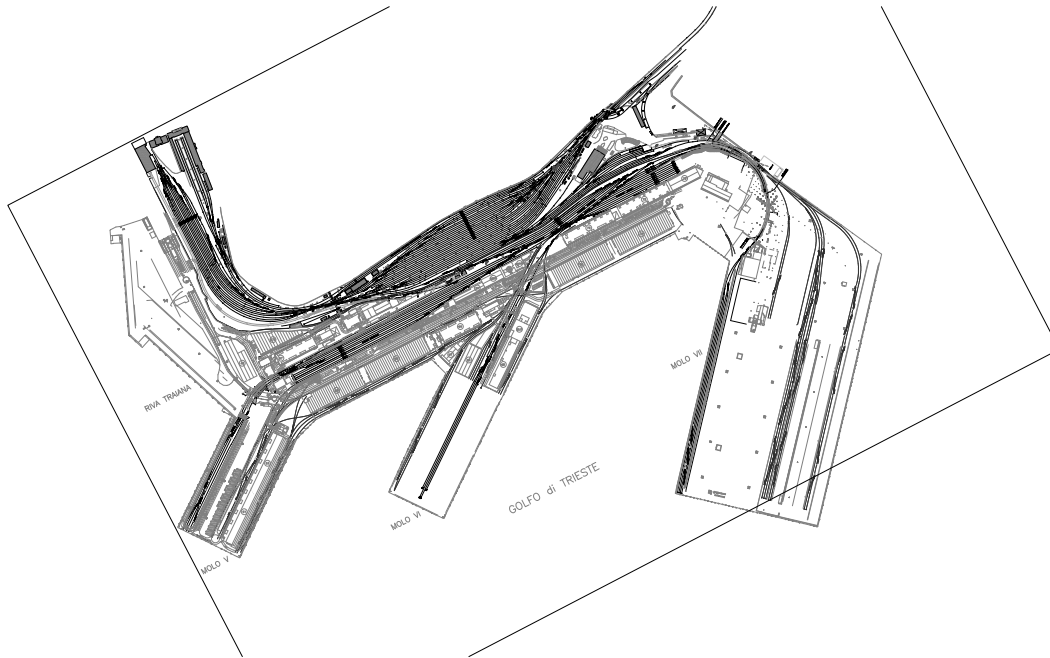


Figure 44 - Synoptic map of the track layout for the Port of Trieste – Source: Adriafer

The rail services available from Trieste in fact reach, with different frequencies, Austria, Germany, Hungary, Croatia, Switzerland, Czech Republic, Poland, Luxembourg, Bosnia and Herzegovina and Slovakia. The Port of Trieste, in terms of freight flows handled by rail, is the first port in Italy and this is also perceived by the railway flows that depart from or arrive at the various port terminals every day. In terms of routes, the Port is connected by rail with 8 major Central European countries, creating a logistical network thanks to the infrastructural articulation with more than 31 different locations distributed throughout the Mitteleuropean region. The largest flows, also due to their geographical position, coincide with Germany, Austria and Italy itself. Every month from Trieste Campo Marzio approximately 42 convoys depart and just as many arrive, resulting in a constant flow of important monthly arrivals/departures, with frequencies of up to 13 convoys per week and 50 per month for the most popular routes.

Although the port of Trieste is the Italian port of call with the greatest international vocation, there have been recent pioneering experiences which have opened up new models for intermodal transport between the North-East and the Centre/South of Italy.



Figure 45 – Integrated logistical transport system for the Friuli Venezia Giulia Region – Source: Adriafer

It is evident how the Port of Trieste represents the logistics platform of an integrated transport system, both on a regional scale but also with respect to an international level. In this sense, we can see how the Port Authority of the Eastern Adriatic Sea has initiated a series of strategic partnerships both with the dry port system present on the regional territory, with regard to the freight villages of Trieste, Cervignano and recently also Gorizia, but also holds 100% of the shares of the company Adriafer, and its subsidiary Adriafer Rail Services, which has taken on the role of Multimodal Transport Operator, in order to directly manage the handling of convoys in line also outside the boundaries of the port of Trieste. The organization of the subsidiaries of the port of Trieste shows how the entire logistic system of Trieste is oriented towards an increasingly conscious and driven use of rail as a modal choice in order to significantly reduce logistics externalities.

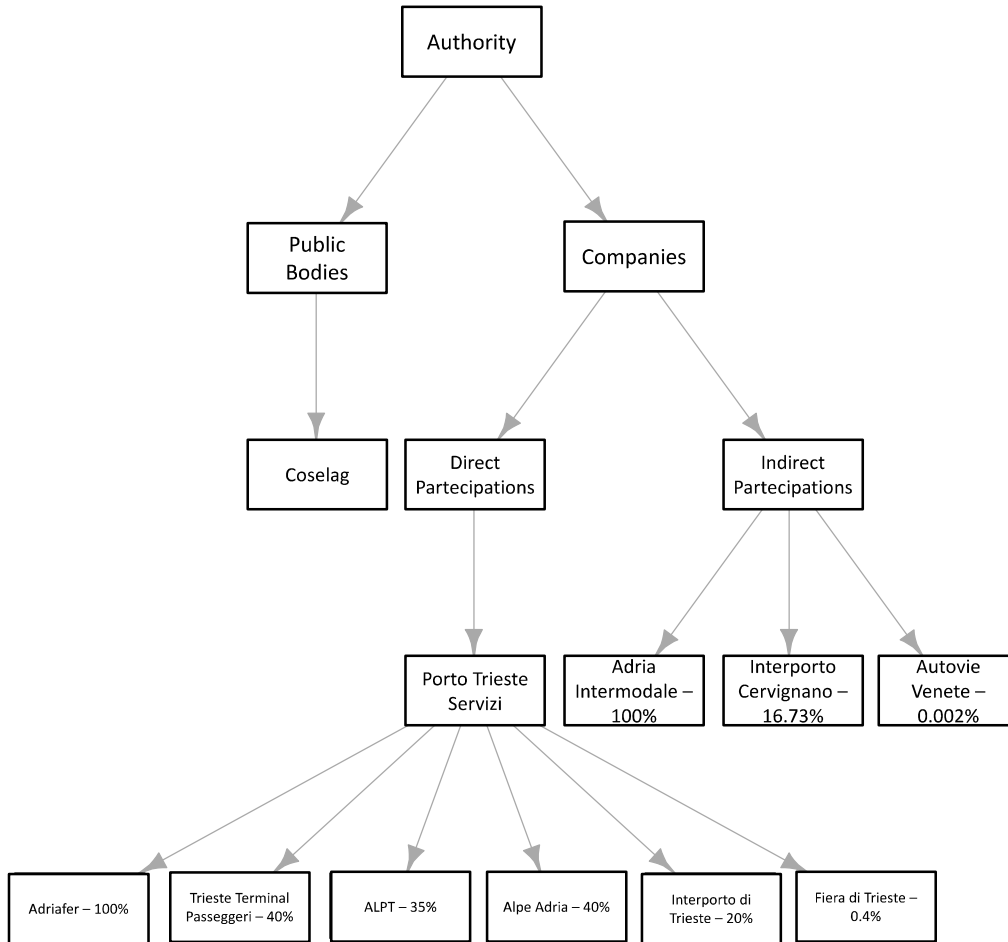


Figure 46 – Structure and shareholdings of the Port Authority of Trieste – Elaboration of the authors

2.8.3 Methodologies and actions

This study proposes to quantitatively and qualitatively analyze the impacts generated by the choice made by the port of Trieste to move a large share of traffic by rail, with a consequent reduction of the negative externalities communally associated with road transport, including the reduction of emissions and road congestion.

The report is aimed at gaining a better understanding of the actual pattern of land connections and relations originating from the port of Trieste and connecting it with the major logistic nodes and destinations within the European continent. As highlighted in the previous paragraphs, gaining such a knowledge would allow understanding the real routes followed by freights, allowing also a more detailed estimate of transport emissions and a comparison among different transport routes. Furthermore, by understanding the spatial pattern of production areas, demography and logistic infrastructure, would allow understanding the potential expansion of the market areas from the port itself and, therefore, the expansion of the hinterland itself.

Criteria	Data Collection	Analysis
Rail freight flows assessment	Analysis and mapping of the main known railway flows	Plot the different routes with origin and destination of freights on a map
Geographic proximity	Identify all cities and logistics distribution center and hubs within a certain distance from the port (e.g. 100 km)	Plot the locations of each city/town and hubs on a map
Designing railway infrastructure	Identify the railways connection from the port to other locations (highlighting any infrastructure constraints)	Plot the infrastructure on the same map as step 1

Table 7: Methodologies criteria

For the estimation of emissions attributable to rail freight transport, the analysis was based on trains with a maximum length of 560 metres and 28 wagons, with a maximum load of 44 t per wagon, a total dimensioning of 1,230 t: these dimensional limits are due to the characteristics of the port of Trieste and the load limits of the various railway wagons. In this case, the estimated railway emissions per t/km were estimated to be 23.5². Railway emissions are estimated by multiplying the total weight of the train expressed in tonnes (W) by the distance to be travelled in kilometres (D) and the estimated emissions (Ef), as per the formula: $E_{Train} = (W \cdot D \cdot Ef)$.

2.8.4 Aims and impacts towards design of area-specific strategies for gap/vulnerability reduction and equalization policies

The port of Trieste represents a virtuous example of best practice on a European scale with regard to the modal shift to rail, handling, in 2021, over 51% of its containerized traffic by rail,

² Source:

- Energy Consumption and Carbon Dioxide Emissions in Rail and Road Freight Transport in Spain: A Case Study of Car Carriers and Bulk Petrochemicals - A. Garcia-Alvarez, P.J. Perez-Martinez, I. Gonzalez-Franco – report by Spanish Railway Foundation (FEF), Madrid, Spain and Sustainable Economy of Natural Environment Group (ECSEN), Universidad Politecnica de Madrid, Madrid, Spain (2013).
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reaching and exceeding the targets set by the European Union for 2050. In 2022 the transshipments operated by the port of Trieste were more than 10,600, equivalent to more than 350,000 articulated trucks removed from the road.

The analysis of a rail port hinterland is important to assess the effectiveness of the supply chain that connects the port to the production and consumption areas. Intermodal transport dynamics are fundamental components for the evaluation of the port hinterland, in linking together different modes of transport to move goods from one point to another, exploiting the strengths, in terms of costs and sustainability, of each mode of transport to optimize the logistics chain.

This contribution provides a general overview of the definition of a port hinterland with reference to railway connections, particularly in terms of the reconstruction of the rail links among the Port of Trieste and its major inland destinations. The joint analysis made through desk research coupled with direct collaboration with the railway shunting and handling company (Adriafer) has allowed the primary result of identifying the main areas served by the Port of Trieste, in an analytical manner, but especially through a cartographic representation. The first steps of the analysis so far carried out confirmed the characteristics of the Port of Trieste as an important hub in connecting the sea leg with an efficient railway system for the markets of Central and Eastern Europe. The port of Trieste has achieved significant success in recent years thanks to the strategic development of railway infrastructure. The routing of goods departing from the port of Trieste by train has also allowed greater efficiency in the handling of goods, significantly reducing road congestion and mitigating some of the negative externalities resulting from port activities. This has made the port of Trieste an important logistics hub for goods in transit between Europe and the Middle East. In this contribution, some key dynamics were therefore outlined regarding the role of gateways as main access routes to continental markets, also developing some reflections on the sustainability of freight transport and on the main market operators.

The geographic location of the port of Trieste defines it like a gateway to access the markets of Central Europe for this port represents a significant strategic factor in the context of the environmental sustainability of logistics processes. Thanks to its strong international vocation, the port of Trieste channels large volumes of traffic towards the areas of Central-Eastern Europe (Bavaria, Austria, Slovakia, and the Czech Republic)

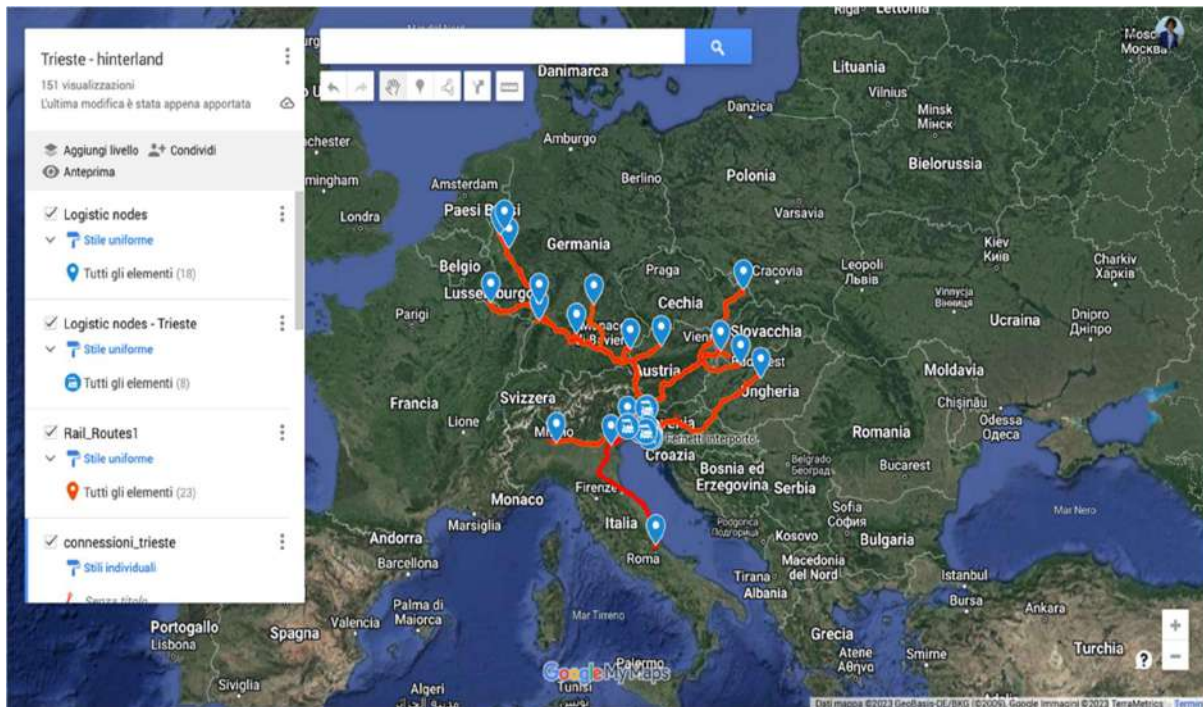


Figure 47 – Spatial structure of the rail connection of the Port of Trieste – Elaboration of the authors

With reference to the environmental impact generated by the railway sector, we can observe that emissions are a linear function of distance, as the locomotives used to move rail traffic are powered by electric motors that take current directly from the overhead line (with the exception of handling within the port). Consequently, in order to assess the environmental impact of rail transport, the electrical energy used along the electrified railway line must be evaluated, which is constant: as the distance increases, therefore, the carbon dioxide emissions generated will also increase directly. In particular, we can see that for long-haul destinations such as Bettembourg (Luxembourg) and Koeln (Germany), more than 35 tonnes of carbon dioxide equivalent will be produced. It is evident that the strategic position of the port of Trieste, aided by the efficient logistical infrastructure that is developed in an extremely articulated manner along different routes in continental Europe, determines that the intermodal hub in Trieste is defined as a logistical platform integrated in the dynamics of trade flows between the Middle East, and in particular Turkey with the countries of Central and Eastern Europe. The ability to convey a major component of the goods transiting through the port of Trieste by rail, thus reducing the traffic of articulated lorries on the road, represents one of the success factors in response to environmental requirements and in terms of transport economy and efficiency.

Destination	Distance covered (in kilometres)	Estimated total emissions (tonne CO2 eq)
Bettembourg (LU)	1.093	35,63
Bratislava (SK)	603	19,65
Budapest (HU)	632	20,60
Burghausen (DE)	482	15,71

Destination	Distance covered (in kilometres)	Estimated total emissions (tonne CO2 eq)
Koeln (DE)	1.123	36,60
Dunajska (SK)	649	21,15
Karlsruhe(DE)	842	27,44
Komarno (SK)	683	22,26
Krefeld (DE)	1.174	38,27
Linz (AT)	502	16,36
Ludwigshafen (DE)	872	28,42
Milano (IT)	412	13,43
Monaco (DE)	527	17,18
Ostrava (CZ)	834	27,18
Padova (IT)	180	5,87
Paskov (CZ)	836	27,25
Pordenone (IT)	128	4,17
Salisburgo (AT)	380	12,39
Villach (AT)	200	6,52
Wels (AT)	477	15,55
Wien (AT)	564	18,38

Table 8: Estimated total emissions per destination

The joint analysis made through desk research coupled with direct collaboration with the railway shunting and handling company (Adriafer) has allowed the primary result of identifying the main areas served by the Port of Trieste, in an analytical manner, but especially through a cartographic representation. The first steps of the analysis so far carried out confirmed the characteristics of the Port of Trieste as an important hub in connecting the sea leg with an efficient railway system for the markets of Central and Eastern Europe. The port of Trieste has achieved significant success in recent years thanks to the strategic development of railway infrastructure. The routing of goods departing from the port of Trieste by train has also allowed greater efficiency in the handling of goods, significantly reducing road congestion and mitigating some of the negative externalities resulting from port activities.

2.9 The numbers on the gaps of the major Italian islands in the European and national context

Insular regions have permanent characteristics and peculiarities that distinguish them from continental regions, whether they are more or less peripheral. This derives from the incontrovertible fact that insularity, understood as territorial discontinuity, implies specific economic, transport, environmental, social and demographic characteristics that determine an objective disadvantage compared to continental territories. In the EU, insularity also represents a significant topic of political, economic and social debate, also due to the number and size of this type of territory.

Europe is characterized by a high number of islands (362), 17.7 million inhabitants and 3.7 million of which in the ultraperipheral regions. Sicily with its approximately 5 million residents (28% of the "island" population) represents the largest European island in terms of size and economic importance. But despite this primacy, it is among the last in terms of GDP per capita. It differs not only from the European average but also from the average levels of other EU islands where there is strong variability compared to the levels of wealth of some European islands (Meloni, Sanjust di Teulada, 2017).

Official statistics show that the further north you go, the higher the levels of development of the 362 EU islands. The GDP per capita of the Northern European islands is higher than the EU average. On the other hand, the Southern European islands have a GDP per capita that is much lower than both the EU average and the average of the 362 islands. These data provide a description of the importance of economic marginality compared to geographical peripherality. There are many islands that are peripheral to the EU, but if they are large, there are few on the margins of economic competitiveness.

2.9.1 Territories and specific areas

In the EU context, Sicily and Sardinia are below the Italian and European average in most social and economic indicators (European Commission Nuts2). Furthermore, there are clear employment imbalances in Sicily and Sardinia with a growth forecast for 2028 far behind the rest of Italy. The strong variability of wealth levels represents one of the many elements of development heterogeneity. Figure 1, which reports the GDP per capita of some European Islands classified territorially as Nuts2 and Nuts3. From the figure it is clear that the GDP per capita of the Northern European islands examined is higher than the EU average level and also the average GDP per capita of the 362 European Islands. On the other hand, the Southern European Islands have a GDP per capita much lower than both the EU average and the average of the 362 Islands.

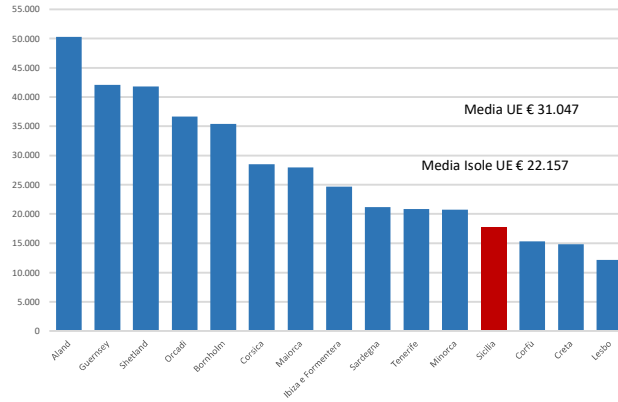


Figure 48 – Per capita GDP of some European islands – Year 2018. Source: Eurostat data processing

In general, in the EU context, Sicily is placed below the Italian and European average in most of the social and economic indicators that the European Commission adopts to make appropriate spatial and temporal comparisons between the Nuts2 regions. In particular, the measure of competitiveness summary deserves specific attention using a complex indicator called Regional Competitiveness Index (RCI), elaborated annually and with respect to which Sicily shows negative positions on some important dimensions, such as: infrastructure, human capital, innovation and, in general, also the quality of administrative action (figure 2).

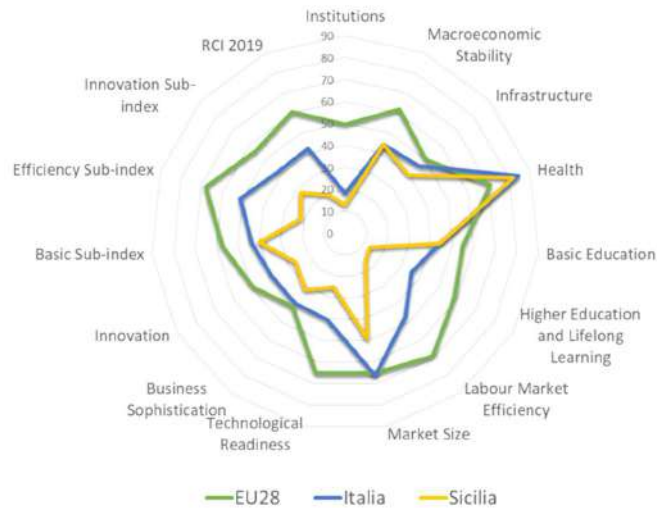


Figure 49 – Competitiveness Index – Year 2019 – Source: European Commission

The following tables (9-10-11-12) provide a clear representation of the positioning of Sicily and Sardinia in the EU context, in terms of GDP and unemployment.

PIL pro capite corretto per il potere d'acquisto												
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
European Union	25.700	25.800	26.000	26.600	27.500	28.200	29.300	30.300	31.300	30.100	32.700	35.500
Italy	27.000	26.600	26.200	26.100	26.700	28.000	28.800	29.400	30.200	28.200	31.500	34.400
Sicilia	17.100	17.200	16.800	16.300	16.700	17.200	17.800	17.900	18.400	17.500	19.400	21.000

Table 9: GDP per capita adjusted for purchasing power, Sicily 2011-2022. Eurostat data

PIL pro capite corretto per il potere d'acquisto												
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
European Union	25.700	25.800	26.000	26.600	27.500	28.200	29.300	30.300	31.300	30.100	32.700	35.500
Italy	27.000	26.600	26.200	26.100	26.700	28.000	28.800	29.400	30.200	28.200	31.500	34.400
Sardegna	19.800	19.900	19.200	19.100	20.000	20.200	20.800	21.200	22.000	20.600	22.900	25.000

Table 10: GDP per capita adjusted for purchasing power, Sardinia 2011-2022. Eurostat data

Tasso di disoccupazione												
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
15-74 anni	European Union	9,9	10,9	11,4	10,9	10,1	9,1	8,2	7,3	6,7	7,1	6,2
	Italy	8,4	10,7	12,2	12,7	11,9	11,7	11,2	10,6	9,9	9,2	8,1
	Sicilia	14,3	18,4	21,0	22,2	21,4	22,1	21,5	21,3	19,9	18,1	16,6
15-29 anni	European Union	22,0	23,8	24,6	23,5	21,8	20,1	18,0	16,1	15,1	16,8	14,5
	Italy	29,2	35,3	40,0	42,7	40,3	37,8	34,7	32,2	29,1	29,7	23,7
	Sicilia	42,5	51,2	54,3	57,0	55,9	57,2	52,9	53,6	51,1	48,4	43,2

Table 11: Total and Youth Unemployment Rate, Sicily 2011-2022. Eurostat Data

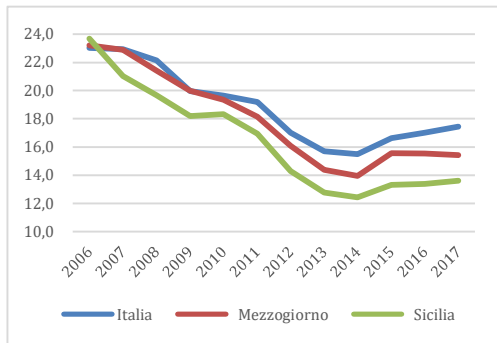
Tasso di disoccupazione												
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
15-74 anni	European Union	9,9	10,9	11,4	10,9	10,1	9,1	8,2	7,3	6,7	7,1	6,2
	Italy	8,4	10,7	12,2	12,7	11,9	11,7	11,2	10,6	9,9	9,2	8,1
	Sardegna	13,6	15,5	17,5	18,7	17,4	17,3	17,0	15,4	14,8	13,0	11,5
15-29 anni	European Union	22,0	23,8	24,6	23,5	21,8	20,1	18,0	16,1	15,1	16,8	14,5
	Italy	29,2	35,3	40,0	42,7	40,3	37,8	34,7	32,2	29,1	29,7	23,7
	Sardegna	42,2	47,5	53,7	50,0	56,4	56,3	45,8	36,0	45,2	40,1	38,7

Table 12: Total and Youth Unemployment Rate, Sardinia 2011-2022. Eurostat Data

Over the last thirty years, the gaps between Sicily and Sardinia have increased especially compared to the regions of Northern Italy, and part of this is attributable to infrastructural gaps, the competitive nature of the production system, the efficiency of the labor market, and factors such as geographical distance from the centroids of economic development (geographic peripherality), chronic economic marginality and insularity (in Armano G., Torrisi and Others (2021) Estimation of the costs of insularity in Documents of the Sicilian Region)

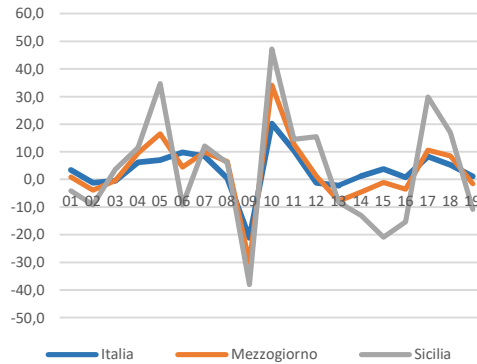
In the description of the context, gross fixed investments emerge; figure 50 highlights the island's lower propensity to invest; figure 51 shows the liveliness of trade but also the vulnerability to changes in the reference markets.

Fig. 50 - Gross fixed investments - Years 2008-2017 (% incidence on GDP, chained values 2015)



Source: Istat data processing

Fig. 51 - Imports and exports with foreign countries - Years 2001-2019 (% changes)



Source: Istat data processing

The investment in human capital recorded in the Italian islands is low (see fig. 52).

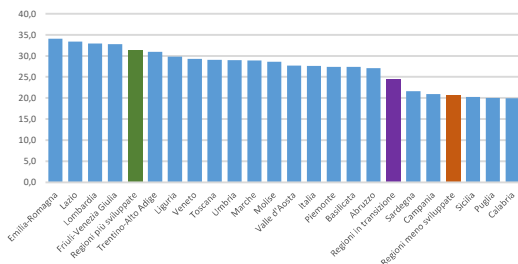


Figure 52 - Tertiary education rate in the 30-34 age group by region - Year 2019 (%). Source: Istat data processing

Figure 53 below represents the average Generalized Transport Costs (GTC) of all recipients for each region as an inverse measure of accessibility. As shown, geographically central regions have the lowest transport costs due to their central location within the road network, while peripheral regions generally suffer from higher transportation costs

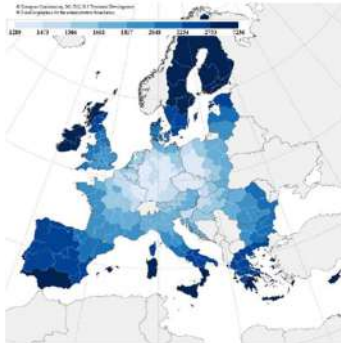


Figure 53 – Average GTC for each NUTS 2 region

When analyzing the breakdown of the cost of transport, 60% can be attributed to time and fuel. The cost of time is composed of the value of wages and the value of rest time. While distance costs are determined by fuel prices and fuel consumption. Other relevant cost components are related to maintenance, insurance, financing, depreciation, and indirect costs, which count for around 40% (Eurostat, 2016). From Figure 54 and figure 55 below, it emerges that even the breakdown into the two main components of 'distance' and 'time' shows a marked heterogeneity between regions.

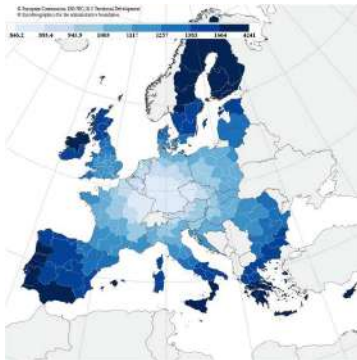


Figure 54 – Distance and time related costs of GTC for each NUTS 2 region Distance-related costs

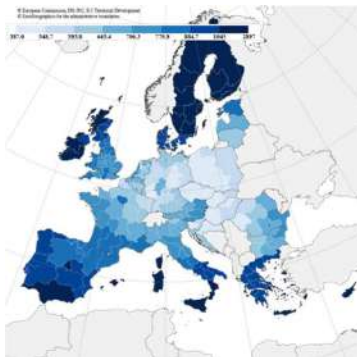


Figure 55 – Distance and time related costs of GTC for each NUTS 2 region b) Time-related costs

An alternative cost estimation strategy to the one considered so far is to weight the cost measures between regions i and j by the bilateral trade flow between regions i and j using the data provided by Thissen et al. (2019). In reports those weighted transportation costs. It makes the marginality of some regions more apparent.

Even from a more general perspective than focusing on transport costs, it emerges that the competitive capacity of regions shows similar patterns. This is evident from the Regional Competitiveness Index (RCI).

Hence, we can affirm that the two islands on which this work focuses (Sicily and Sardinia), from a descriptive point of view, are characterised by a marginal position not only from a merely geographic point of view, but also from the point of view of transport costs and, more generally, of territorial competitiveness. A more detailed analysis will be offered below to verify the effects of this marginality on their economic performance.

The data on the context of the islands clearly express the competitive disadvantage of Sicily and Sardinia. This translates into costs for companies and citizens.

From this context arises the need to study and measure the determinants of the recorded regional gaps. The objective will be to formulate empirical contributions that study and quantify the determinants of the gaps by estimating the costs of insularity, economic marginality and geographical peripherality.

Below we will describe the empirical approaches used to estimate the weight that some determinants have on the level of wealth (GDP), commercial performance, attractiveness and resilience, of a territory (GDP) that presents conditions of insularity, economic marginality and peripherality. From our research questions (Spoke 7 CT) we obtained the first results enriching the scientific debate with empirical contributions on which to orient policies and the comparison with stakeholders

2.8.2 Context and stakeholders

The "Island or Marginality" round table, held on October 27, 2023, at the Department of Economics and Business of the University of Catania (UNICT), brought together key national stakeholders, policymakers, and experts to discuss the challenges and opportunities faced by insular and marginal territories, with a specific focus on Sicily and the major Italian islands. The event featured high-profile institutional representatives, including the President of the Bicameral Parliamentary Commission on Insularity, Avv. On. Tommaso Calderone, and the Sicilian Region's Councillor for Economy and Budget, Avv. On. Marco Falcone, who provided insights into the current legislative and financial frameworks. Additionally, leading research institutions and financial organizations contributed to the discussion, including the Documentation, Research, and Studies Centre on Risk Culture (represented by President Dr. Antonio Pogliese), the Eurispes Observatory on Insularity (led by President Prof. Aldo Berlinguer), and Banca Agricola Popolare di Ragusa (with General Manager Dr. Saverio Continella). The event also benefited from the expertise of Milano Finanza Gruppo Class, represented by Chief Editor Dr. Salvatore Licciardello, providing an economic and financial perspective on the topic.

2.8.3 *Methodologies and actions*

The round table served as a platform for presenting and debating the initial research findings developed by the UniCT research group, the Eurispes Observatory, and the Centre for Risk Studies, offering a comparative perspective with the legal assessments provided by the Bicameral Parliamentary Commission. The event was structured around a series of institutional greetings, expert presentations, and stakeholder contributions. Opening remarks were delivered by Prof. Roberto Cellini, Director of the Department of Economics and Business, and Prof. Angela Bergantino, National Scientific Coordinator of Spoke 7. The technical discussions covered a wide range of topics, including the impact of transport networks on exports (Prof. Lucio Siviero), the relationship between insularity and GDP (Prof. Giampiero Torrissi), the cost of living in marginal territories (Prof. Giuseppe Notarstefano), economic policies for island development (Prof. Marina Cavaliere), and the attractiveness of insular regions on a national and international scale (Prof. Salvatore Corrente). These insights were further enriched by stakeholder interventions from representatives of financial, academic, and political institutions, fostering a multidisciplinary approach to addressing the challenges of insularity and marginality in economic and policy-making contexts.

2.8.4 *Objectives and impacts*

We presented the initial results of our research to the stakeholders. There is a cost linked to geographical aspects (distance, accessibility) and a cost linked to structural aspects (infrastructure, services, efficiency of the labor market, public administration) says Gianpiero Torrissi, professor of Applied Economics at UniCT; Our first analyses, continues Torrissi, aim to contribute to the separation of the effects of the structural characteristics of Sicily from those of insularity regarding its economic performance. Infrastructure represents an accelerator of development processes and we have quantified the dependency ratios even in the presence of conditions of insularity, says Lucio Siviero, professor of Transport Economics at UniCT.

In this context, the lack of services or the inequality in their access negatively affects the structure of the cost of living index, making it appear from official statistics that the cost of living on the islands is lower than that of northern Italy.

We need to radically rethink the models and schemes for measuring the cost of living in order to more effectively guide public policies without worsening social and territorial cohesion, highlights Giuseppe Notarstefano, professor of Economic Statistics at Lumsa and National President of Catholic Action.

From the first analyses on the competitiveness of the regions, policy actions emerge. They were measured through the contribution of Prof. Salvatore Corrente, professor of Mathematical Methods for Economics at UniCT. With the application of specific mathematical models, we were able to determine how the position of development and economic attractiveness of Sicily would change if specific interventions were made on the aspects of the structural component of the economy.

From our elaborations, a clear improvement in the position of development and

attractiveness of the island emerges, if interventions were made not only on infrastructures but also and mainly on the efficiency of work, on the availability and efficiency of services and on the image and communication policies of the territories, declares Prof. Benedetto Torrisi, professor of Economic Statistics and moderator of the round table.

This is possible: European islands in conditions of peripherality and ultra-peripherality have experimented with fiscal policies and European recognitions that have guaranteed the recovery of economic gaps, as in the case of the Canary Islands or the Balearics, says Marina Cavalieri, professor of Public Policies at UniCT. There is a lot of literature on these expedients, both theoretical and empirical.

Aldo Berlinguer, professor at the University of Cagliari and President of the Eurispes Observatory on Insularity, states: "Islands are an important national asset. Their number, their connotation, their peculiarities are often ignored by us Italians, who in fact think of our country as a peninsula, a boot. It is therefore necessary to identify the peculiarities and also the disadvantages that derive from them by preparing concrete solutions. The principle of insularity, introduced in the Constitution in Article 119, sixth paragraph, obliges us to do all this."

In this context, banks play a crucial role but must take into account the contextual costs that customers suffer. "The Bank seeks to reduce the negative effects of the conditions of insularity by facilitating access to the capital market and amplifying industrial and financial investment opportunities; Our Bank is clear about these costs and seeks to alleviate the insular diseconomies, declares Dr. Saverio Continella, General Manager of the Banca Agricola di Ragusa.

"The prospects of insularity and autonomy for Sicily must no longer be expressed in the mere claim of principle, no longer in formal aspects. The risk is that those same fundamental principles such as the self-determination of Sicily will lose credibility if words are not followed by facts in the commitment to reduce marginality. Today, after many years of policies with lights and shadows, before asking, we are called to demonstrate that we have what it takes. We are committed, in this sense, to building an equal relationship of the State. Having the tools, we can intervene on the reduction of the gap and on policies of innovation and support for economic hardship" declares the Hon. Marco Falcone Councilor for Economy and Budget of the Sicilian Region.

We are in the hearing phase says the Hon. Tommaso Calderone President of the Bicameral Parliamentary Commission on Insularity. "The Parliamentary Budget Office will give us a hand in relation to the indicators and the Commission that I preside will adopt all the political strategies in compliance with the functions and competences established by law. These moments of discussion are useful in the logic of absorbing from this discussion table further elements of reflection that can be translated into policy".

The main impacts generated from this action was the increasing knowledge to support stakeholders in identifying constitutional reforms and creating implementing decrees aimed at reducing gaps.

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