

## Article

# Water Resources and Health Tourism in Val di Sole: Key Elements for Innovating with Nature in the Italian Inner Territories

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**Abstract:** The contexts addressed by the Italian National Strategy for Inner Areas (SNAI) often lack successful regional policies and systemic territorial approaches to achieve effective transformations towards resilient territories. These issues are addressed by the ongoing project “B4R Branding4Resilience.” This contribution aims to present and discuss its first results in the focus area of Val di Sole, Trentino-Alto Adige Region (Italy). The main goal of the University of Trento unit is to pursue leadership in innovating with nature in small thermal villages. The aim is to create a territorial strategy based on the value of the water resources and thermal systems by promoting the enhancement of their natural capital. An interdisciplinary and multi-scalar methodology has been adopted to combine qualitative and quantitative approaches; a data collection process was used to explore the natural identity of Val di Sole to comprehend the ecological and spatial elements; a co-design activity was conducted with the local community’s engagement to propose a resilient territorial strategic vision. As a result, the “Val di Sole Blueprint” represents a strategic tool to implement thermal landscapes as ecological design resources for the territory and to support sustainable territorial development for a better quality of life.

**Keywords:** fragile landscapes; inner territories; innovating with nature; water urbanism; health and wellbeing; thermal landscapes; territorial capital; slow tourism; co-design; branding4resilience

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## 1. Introduction

The current (post-)pandemic era has turned the attention to natural and urban environments in marginal areas [1,2]. In new and different conditions of life and work models, small villages all over Italy—from the Alps, across the Apennines, and to the islands—are spaces for re-habitation [3]. Moreover, their territorial capital, made up of agricultural and river systems, woods, and minor infrastructures and often underestimated, is waiting to be reinterpreted, reused, and renewed. Working for the regeneration of these areas, defined by the National Strategy as Inner Areas (SNAI), means acting in almost 53% of municipalities, 23% of the population, and about 60% of the Italian territory [4]. Studies and funding initiatives (i.e., ESPON, SNAI) have mostly focused on economic, services, and infrastructure marginality, classifying inner areas through quantitative indicators mainly oriented towards assessing their accessibility to essential services (e.g., hospitals, schools, train stations, and main cities). The value of natural resources and the innovative practices to take care of the landscape and the built heritage in vulnerable contexts have not yet been fully explored and used as indicators of quality of life.

In this framework, the project “B4R Branding4Resilience” (PRIN 2020–2023) aims to investigate inner territories in relation to highly densely inhabited areas, looking for a balanced human-natural lifestyle [5,6]. This applied research intervenes in four inner areas in Marche, Trentino-Alto Adige, Piedmont, and Sicily regions to design tourist

infrastructures in selected small villages (namely the “focus areas”) for resilient communities and habitats. The ongoing project is structured in three main stages: a first exploration phase, which focuses on spatial interactions to identify and describe the local contexts and community; a second co-design operative phase; and a third co-visioning phase, both involving local actors and communities [5,6].

This contribution presents and discusses the first results achieved in the exploratory and co-design phases by the University of Trento research unit, which aims to pursue leadership in innovating with nature in small thermal villages of the Val di Sole focus area. The aim is to create a territorial strategy on the value of water resources by promoting the enhancement of the territorial capital through spatial transformation. The paper is structured in six sections: Section 2 illustrates the governance, theoretical and territorial backgrounds of this research; Section 3 describes the methodology used to conduct the study; Section 4 presents the results obtained in the selected focus area, which are discussed in Section 5. Here are presented the final considerations and outlined future research directions.

## 2. Background

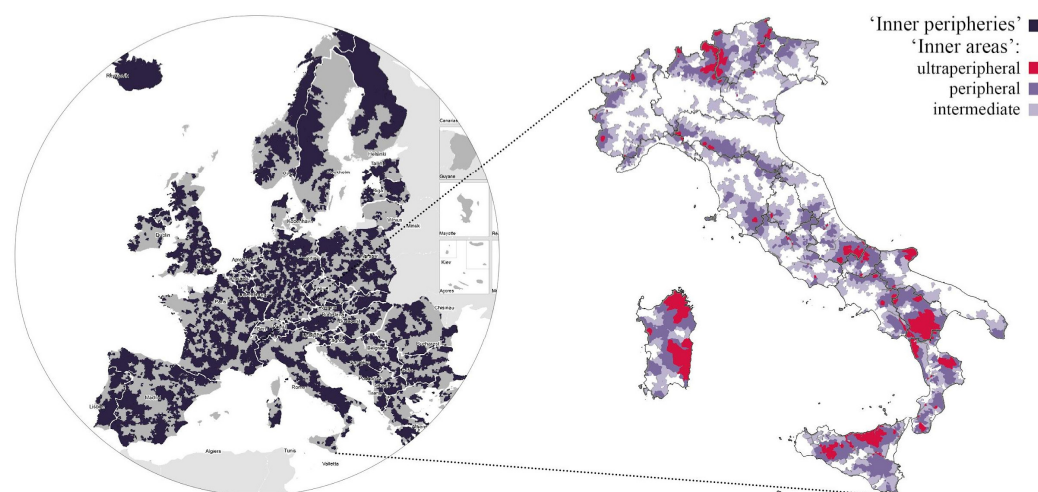
Academic research on territorially imbalanced areas is still in its early stages, as demonstrated by the prevalence of exploratory studies and the use of a variety of adjectives—such as “peripheral,” “marginal,” “inner,” and “inland”—to identify them. The existing literature mainly concentrates on Asia and Europe, with Italy as the second most active country globally (after China) and first on Europe (followed by the United Kingdom and Spain), in researching practices related to territorially imbalanced areas [7]. These areas are acknowledged as critical “reservoirs of resilience” [4] (p. 45) because of their richness in environmental resources, vernacular knowledge, cultural artifacts, and potential uses. However, because they are often exposed to various human and natural hazards, they ought to be understood, planned, and managed with an integrated multi-level approach.

### 2.1. Governance: From Global to Local

The European operative framework for the definition of “inner peripheries” was originally developed by the programs GEOSPECS [8] and PROFECY [9], led by the European Spatial Planning Observation Network (ESPON): according to social, economic, and spatial drivers of territorial imbalance, four types of “inner peripheries” were identified (i.e., areas with higher travel time to regional centers; interstitial areas with lower economic potential; areas with poor access to services of general interests; and depleting areas).

The objective of the past 2014–2020 European Cohesion Policy was to promote smart, sustainable, and inclusive growth in the EU by fostering development opportunities in areas suffering “territorial imbalances” [10]; the current 2021–2027 EU cohesion program proposes to tackle this challenge in connection with both the green and digital transitions [11].

Italy has translated these European principles into a national-level planning tool, the 2014–2020 National Strategy for Inner Areas (SNAI) [4,12], to counteract the marginalization and demographic decline of the Italian “inner areas” (Figure 1). These are located away from the more developed zones, including intermediate, rural, and mountain territories. An indicator of the level of accessibility to certain services (i.e., the upper secondary education services, a first-level emergency care hospital, and a regional category railway station) is used to define them. The SNAI has been recently taken up by the 2021 National Recovery and Resilience Plan (PNRR) [13]: the latter establishes special interventions and funding for improving the levels and quality of education, health, and social services in the Italian inner areas, which have asymmetrically suffered the effects of the COVID-19 pandemic [14] (p. 217). Finally, the SNAI Strategy links challenges such as resilience, adaptation, and mitigation to global climate change and associated risks [4] (p. 45) and [15] (p. 15, pp. 51–52).



**Figure 1.** Left, Inner Peripheries in Europe, without distinguishing between the four types. Right, map of the Italian Inner Areas, with different degrees of peripherality (intermediate, peripheral, and ultraperipheral areas). Coordination Sara Favargiotti, graphic elaboration Chiara Chioni, 2022. Data sources: SNAI (2013), ESPON PROFECY (2017).

## 2.2. Theories: Learning from the Risk

The mountain is an anthropogeographic element, meaning that human activities are distributed according to the topography of the land surface [16]. As stated by the SNAI, a significant part of the Italian inner areas is mountainous [17]; such features have always been considered both a problem and a resource [16,18]. Indeed, mountain territories experience the contradiction of being isolated, marginal, and fragile—due to continuous depopulation phenomena and territorial overexploitation as well as sudden critical events (i.e., natural disasters and extreme weather conditions) [16]—, but at the same time being geological, ecological, and socio-economic resources. These endogenous resources, if protected and enhanced, can valuably contribute to countering the socio-spatial marginalization of the inner territories in mountain areas. These are contexts in which, despite the awareness of different disadvantages, there is still evidence of a strong relationship between community and territory, in terms of culture, collective memory, and environmental sensitivity, that contributes to tackling the issues of land preservation and risk mitigation [19].

The pandemic and subsequent crisis have placed greater emphasis on the dichotomous relationship between risk and resources inherent in mountains. Specifically, “COVID-19 has dramatically highlighted how the territorial dimension has long been expelled from national policies to be reduced to a mere diagrammatic and abstract space” [20] (p. 13). Nowadays, coping with the risks in these areas requires reevaluating the natural resources for climate change mitigation and adaptation for biodiversity conservation, health and wellbeing enhancement, and hazard protection. This implies taking care of the landscape and its natural and built heritage, such as the dry-stone walls, the stream floor beds, and the forests [19]. However, the protection of the territory in the inner territories is often inadequate. The terms “protection” and “conservation” have been widely used in a binding sense, rather than the care of territorial resources. Through protection comes the safety of the territory, a prerequisite—along with basic services—to counteract the phenomena of abandonment and demographic decline and to relaunch development processes.

### 2.3. Territories: Water Thermal Landscapes

From Greek and Roman times to the present, thermal springs and baths have produced positive processes for psychophysical wellbeing, moments of socialization and conviviality, and transformations of landscapes and cities throughout Europe and Italy [21]. Nevertheless, the concept of *thermae* has transformed over time, taking on new meanings and values [22]. The six generations of the Italian so-called “thermalism” [23,24] have referred to various models of thermal tourism systems, including the leisure tourism of the late 19th century, the health tourism of the 20th century, and the slow and wellbeing tourism of the 21st century. Despite these differences [25], all these systems agree that the thermal-mineral waters, due to their exceptional chemical-physical and organoleptic qualities, are significant economic resources that should be protected and wisely managed.

Given the dual nature of the thermal baths—both as structures with a strong connection to their local context and as a legacy of health and wellbeing care—it appears necessary for many inner thermal areas to improve themselves by designing new networks: indeed, an interconnected system can preserve the unique qualities of each location while giving them new strength and visibility (see, as references, the European Historic Thermal Towns Association and the Italian National Association of Thermal Municipalities).

The Alpine context of the Val di Sole in Trentino is characterized by a unique condition of water landscapes: in particular, its side valleys of Peio and Rabbi are the starting points for a narrative exploration of a territorial strategy based on the value of thermal water resources [26].

### 3. Methodological Approach

The methodological structure of the ongoing research project “B4R Branding4Resilience” is based on a common approach, collectively designed and adopted by all four research units, which builds on a Research by Design approach [6,27,28]. This is used to describe the various ways in which design and research are interconnected in order to produce new knowledge through the act of designing [6,17,27,28]. The methodology is structured according to three main phases corresponding to the three-year research period: the exploration (year 1), the co-design (year 2), and the co-vision (year 3) [5,6]. The exploration phase consists of the actions of reading and interpreting the selected focus areas through mapping and analysis of a variety of open data coming from multiple national and local sources. This first phase is based on categorizing and grouping the collected data within four main dimensions (i.e., Dimension 1 “Infrastructure, landscape, and ecosystems,” Dimension 2 “Built and cultural heritage, and settlements dynamics,” Dimension 3 “Economies and values,” and Dimension 4 “Networks and services, community and governance models”) [6]. The resulting maps, constructed on the same categories of data for the four focus areas, allow transversal comparisons between them. A summary portrait map identifies the peculiarities of each area towards the creation of a tailored territorial brand during the second (co-design) and third (co-visioning) research phases.

In response to the strategic challenges emerging from the first exploration phase, the co-design phase provides the holding of workshops in each of the focus areas, involving local actors and stakeholders [29]. In the ongoing co-visioning phase, the territorial capital of Val di Sole will be valued through the B4R’s strategic spatial visioning process, which will also increase the community’s capacity for transformation. This last phase is intended to produce, together with the local actors, a transvalley and multilevel collaborative strategy to enhance and promote the “shapes of water” in the Val di Sole.

In this framework, the University of Trento research unit has procedurally contributed to each phase according to the specificities of its selected focus area.



### 3.1. The Val di Sole Inner Territory: A Case Study

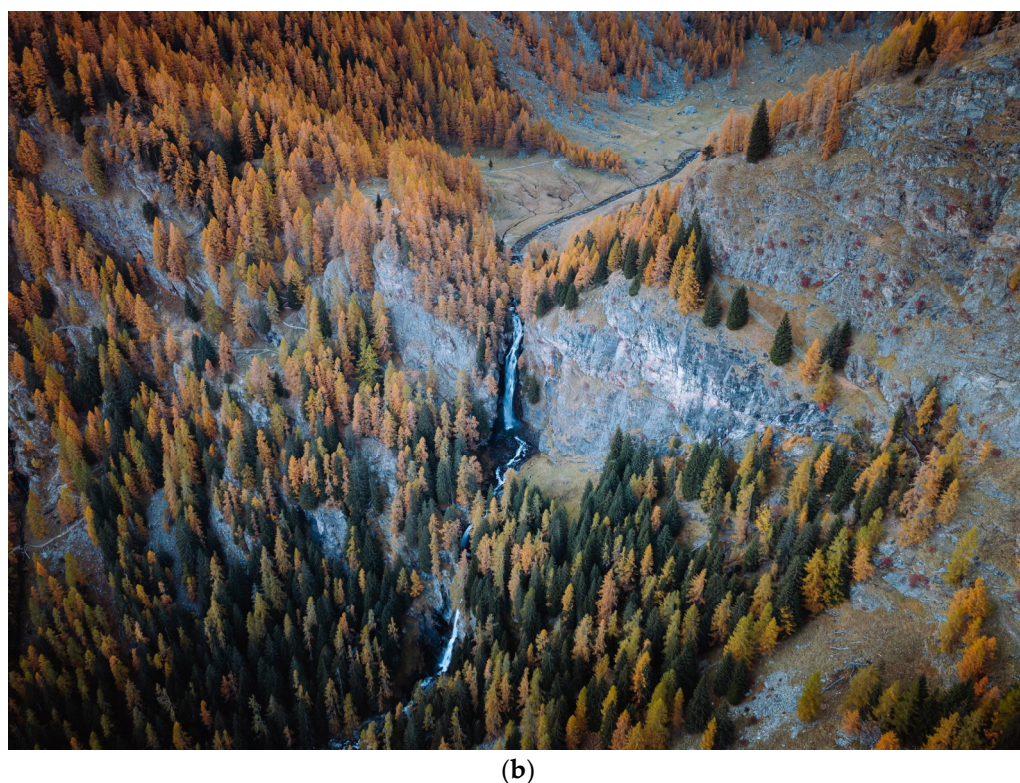
The selection of the focus area in the Trentino-Alto Adige region has moved to the Val di Sole because it is one of the two SNAI pilot areas in the region and has two small villages, Peio and Rabbi, both characterized by thermal baths and springs. The valley offers a unique condition of water resources in a variety of qualitative forms, such as glaciers, lakes, rivers, streams, and waterfalls. This inner territory, which extends for about 611 km<sup>2</sup>, comprehends 13 municipalities (Caldes, Cavizzana, Commezzadura, Croviana, Dimaro Folgarida, Malè, Mezzana, Ossana, Peio, Pellizzano, Rabbi, Terzolas and Vermiglio) scattered in many small hamlets. Since 2010, the Val di Sole has been a valley community (lit. *Comunità di valle*) [30], and in 2016 it was recognized as the second SNAI pilot area for the Autonomous Province of Trento (after Tesino valley). Following the SNAI input, the Province came up with a strategic project, comprehending an overview of the actual conditions and the evolutionary trends of the valley towards the desired future scenario of sustainable development [31].

The mountainous territory influences the population distribution and settlements conformation: about 15,600 inhabitants (ISTAT, 2020) mainly reside in the main centers corresponding to the ancient areas of anthropization [31]. The territory is characterized by different conditions of vulnerability that, over time, have resulted in different responses to extreme natural hazards, revealing a strong fragmentation of skills and knowledge-local in natural hazard prevention [31].

The Val di Sole derives its name from *Sol*, which dates to the Celtic water god *Sulis*, the Great Mother source of life (whom the Romans identified with Minerva): indeed, the element that mainly characterizes this territory is water, in all its forms and related activities especially the ones linked to thermal resources (Figure 2). Since the end of the 19th century, the valley has undergone a significant transformation from an area purely dedicated to silvopastoral activities: the incomings of thermal tourism have led to the need for new facilities [32]. Nowadays, the thermal springs of Peio and Rabbi, located in the Stelvio National Park, are still valuable resources for the wellness, tourism, and productive systems and the engagement of the local population [26]. In addition to the impressive quantitative presence of different forms of water, the quality of the Val di Sole's thermal waters, related to the soil properties, is unique.



(a)



**Figure 2.** (a) Thermal fountain in Celentino, Peio (TN, Italy). The information sign reports, “[...] Medium-mineral, ferruginous, alkaline-lithic water, mineralized in minor elements. It is very rich in free carbon dioxide and bicarbonate ions. Therapeutic action: These waters have laxative and diuretic effects and are suitable for the treatment of diseases of the liver, kidneys, nervous system, and metabolism”. Photo by Nicola Cagol, 2021. ©Branding4Resilience—UNITN, 2020–2023. (b) Saënt waterfalls (low and high) in Rabbi (TN, Italy). Formed by the Rabbies stream, the waterfalls are located within the Stelvio National Park, at an altitude of about 1700 m a.s.l., and can only be reached on foot. Photo by Nicola Cagol, 2021. ©Branding4Resilience—UNITN, 2020–2023.

### 3.2. Exploration: Qualitative and Quantitative Analysis and Mapping

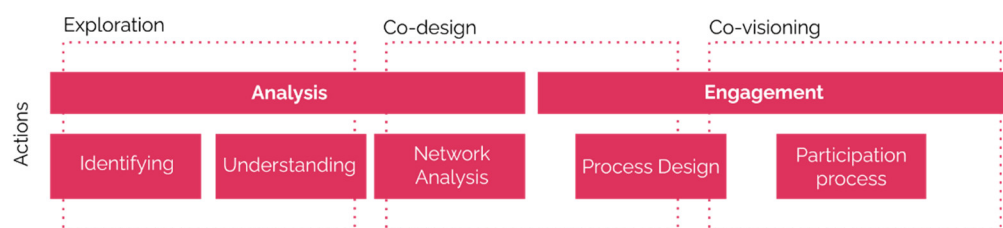
The University of Trento research unit has specifically contributed to elaborating the dataset organization, specifically focusing on the definition of Dimension 1, “Infrastructure, landscape, and ecosystems.” [6]. The authors proposed an interdisciplinary approach based on the integration of landscape ecology, territorial metabolism, mapping, and spatial data. The mapping process was used to spatialize open data and information collected at the European, national, and local scales. It was devoted to transmitting knowledge about the landscape heritage, comprehending water resources, agricultural systems, forests, natural, and human landscapes. Based on the B4R’s methodological approach, the main steps of the exploration process were:

1. qualitative and quantitative data collection and structure from multiple open data sets in a new dataset based on ETRS89 UTM Zone 32 North coordinate system (code EPSG 25832);
2. thematic maps creation from the spatialization and the reworking of the data updated in QGIS;
3. actual resources and potential values identification;
4. synthesis map (namely the portrait map) creation, enlightening the natural identity of the Val di Sole.

Meanwhile, also qualitative investigations were conducted: a photographic campaign by the photographer Nicola Cagol in 2021 and a stakeholder mapping process (Figure 3). The professional photographer documented—by following the rhythm of the seasons from summer to winter—the focus area according to the water cycle: from the



highlands to the small villages on the valley floor, in search of the different forms of water, whether natural expressions or testimonies of human presence.



**Figure 3.** University of Trento research unit's methodological approach for the stakeholder analysis and mapping, through the three phases of the B4R project. Coordination Sara Favargiotti, graphic elaboration Angelica Pianegonda, 2022. ©Branding4Resilience—UNITN, 2020–2023.

The stakeholder mapping aimed to identify the local actors who have influence or interest in the project process and goals. During the first months of research, various informal interviews were conducted to start the stakeholder mapping process. Following the first findings, other key stakeholders were interviewed and asked to provide their understanding of the territory and the community to have a deeper comprehension of the area and to identify other key actors. The proper mapping and analysis processes have been developed through a series of activities referring to the Visual Toolbox for System Innovation by Climate-KIC [33]. Through a brainstorming exercise, the research group identified the interested parties, representatives of local institutions, associations, communities, and economic sectors. Then, a dialogue with the key local stakeholders determined their involvement in the project and provided a deeper insight into the relationships between them. Some of them have been asked to take part in the co-design workshop held in February 2022 in the upper Val di Sole. During this activity, local actors were observed to analyze their relationships: specific networks emerged, expressing behaviors and trends inside the local community.

Between the co-design and co-visioning phases, the stakeholders have been further analyzed and characterized according to their specific interests, influence, and power.

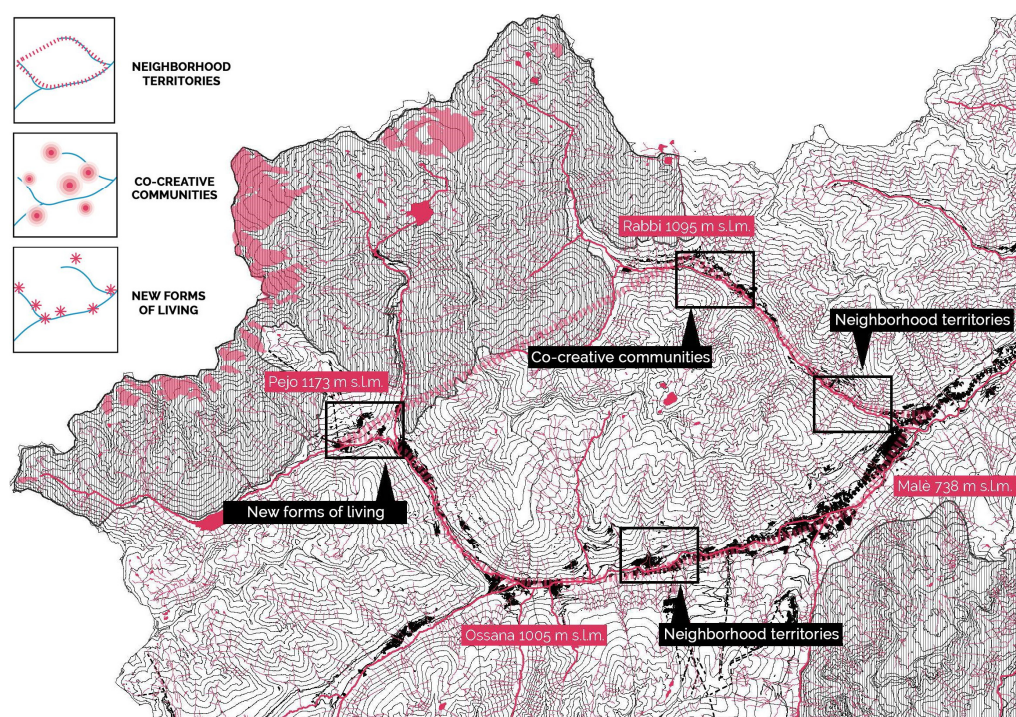
### 3.3. Co-Design: Driving Scenarios through Design Experience

The co-design workshop organized by the authors in the Val di Sole was the third of the four workshops held in each focus area of the B4R research project. The workshop was organized in the two main locations of the focus area—the side valleys of Peio and Rabbi—and it was conceived to deeper investigate the Val di Sole. Indeed, through design explorations and in-field experiences, some of the territorial challenges were addressed and deepened.

Since the valley is strongly characterized by blue infrastructures that generate precious resources and cultural and economic values (i.e., hydroelectric power stations, mineral water bottling plants, spas, and wellness centers), the co-design process focused on the values and the risks related to water. “Immerse in the Val di Sole. A collaborative transvalley strategy to discover, enhance and promote the shapes of water” was the title of the co-design activity that developed on three thematic tracks, variously related to the different forms of water (Figure 4):

1. The “Neighborhood territories” (lit. Territori di prossimità) track addressed the issue of sustainable mobility in an area strongly dependent on the nearest main centers (i.e., Cles and Trento) for health and educational services. The infrastructure systems have transformed the landscapes, occasionally impacting the topography and the water systems. In terms of travel possibilities, the track explored how to increase slow mobility (i.e., pedestrian and cycle paths) and innovative ways of moving. Tangentially, the track also touched on the issue of the water management

- negotiation, specifically related to the needs of the neighboring territories (as the exponential uses of water in the nearby Val di Non for crop irrigation).
2. The “Co-creative communities” (lit. Comunità co-creative) track addressed the theme of water as a resource and a territorial value, calling for social and collective responsibility. Indeed, cultural and social innovation processes can contribute to enhancing the water as a common good through art, craftsmanship, and territory promotion (for example, by recovering areas that are no longer used). In the side valleys of Peio and Rabbi, there are already initiatives that allow visitors and inhabitants to experience and discover the territory: the Ecomuseum in Peio valley is a widespread open-air museum that promotes the cultural growth of the community and the enhancement of knowledge, historical memory, and landscape; in the Rabbi valley, the Ruatti mill, the Braghje dei Bègoi sawmill, and the former cheese factory Casèl di Somrabbì, to name a few, offer visitors the chance to learn about traditional working techniques, to observe masterpieces of mechanics, and to visit preserved architectural heritage embedded in the alpine landscape.
  3. The “New forms of living” (lit. Nuove forme dell’abitare) track investigated the built heritage in relation to the current settlement dynamics. Nowadays, the historical cores of Peio and Rabbi, unchanged over the last two centuries, face the result of the massive building expansion that occurred in the 1960s, with the development of the thermal and ski resorts. The seasonal tourist flows make the human presence in the valley extremely variable, raising crucial challenges as to the environmental impact these flows have on the territory. This tourism model is now in crisis, determining the search for a renewed balance between livability, environmental responsibility for future investments, tourist awareness, and new ways of experiencing the territory.



**Figure 4.** Zoom in on the upper Val di Sole, Peio and Rabbi, where the co-design workshop was held in February 2022. The map shows the spatialization of the three thematic tracks (represented as icons in the upper left of the figure) on which the co-design activity was based. Coordination Sara Favargiotti, graphic elaboration Angelica Pianegonda (icons), Giacomo Codroico (map), 2022. ©Branding4Resilience—UNITN, 2020–2023.

The workshop aimed to identify operational branding actions [34] that enhance the thermal landscapes of Peio and Rabbi starting from these inputs. The collaborative,

transvalley, and multilevel approach adopted may represent a scalable and adaptable response to the other B4R focus areas and a transferable method for inner territories. The long-term goal is to innovate with nature, considering the landscape heritage not only as a resource to be guarded and protected but also as an element on which to build a new collective narrative: this latter with the aim of sensitizing communities and institutions to imagine a shared territorial strategy.

In this framework, the workshop was organized in collaboration with the start-up RUMA ([www.rumagency.it](http://www.rumagency.it), accessed on 20 June 2022) to have a positive impact on the territory. Efforts were made to optimize car journeys and to use local, recycled, or recyclable materials for brochures, posters, and gadgets (i.e., pochettes and hand-made wooden speakers produced by local companies and cooperatives with a positive social impact on the Province). Finally, emissions that could not be reduced were calculated in terms of CO<sub>2</sub> equivalent and planned to be compensated by planting three trees in areas of Trentino Province affected by the 2018 Vaia storm, with the collaboration of the VAIA project ([www.vaiawood.eu](http://www.vaiawood.eu), accessed on 20 June 2022).

#### 4. Results

Understanding a territory means dipping and digging into the complexity of a multilayered landscape to profoundly comprehend the logic of past transformations, current trends, ongoing dynamics, and possible future scenarios. Landscapes understood as a palimpsest [35], can be effectively addressed only by comprehensively embracing the multiplicity of disciplines embedded within the landscape design. This was one of the main aims of the exploration phase, where the authors combined quantitative and qualitative interpretation tools: we approached the Val di Sole territory by balancing the sensitivity of archeologists and the pragmatism of ecologists. The deep data analysis has been supported by recurrent conversations with local actors to verify and amplify the information—occasionally presenting contradictions—obtained from the various open data sets.

The entire process was supported by the explorative design activities developed during the Landscape Design Studios and the master's degree thesis developed in the Master's Degree in Architecture and Building Engineering at the University of Trento, coordinated by Professor Sara Favargiotti and supported by PhD candidates Margherita Pasquali, Chiara Chioni, and Angelica Pianegonda, with the inputs of the others B4R coordinators and the Val di Sole local actors. Through the spatial visualization, we were able to enhance and test potential future scenarios as well as integrate data and information regarding specific thematic challenges (e.g., landscape and heritage recovery, slow mobility, socio-eco tourism, tourism peaking, climate extreme changes in alpine territories).

##### 4.1. *The Exploration of Val di Sole*

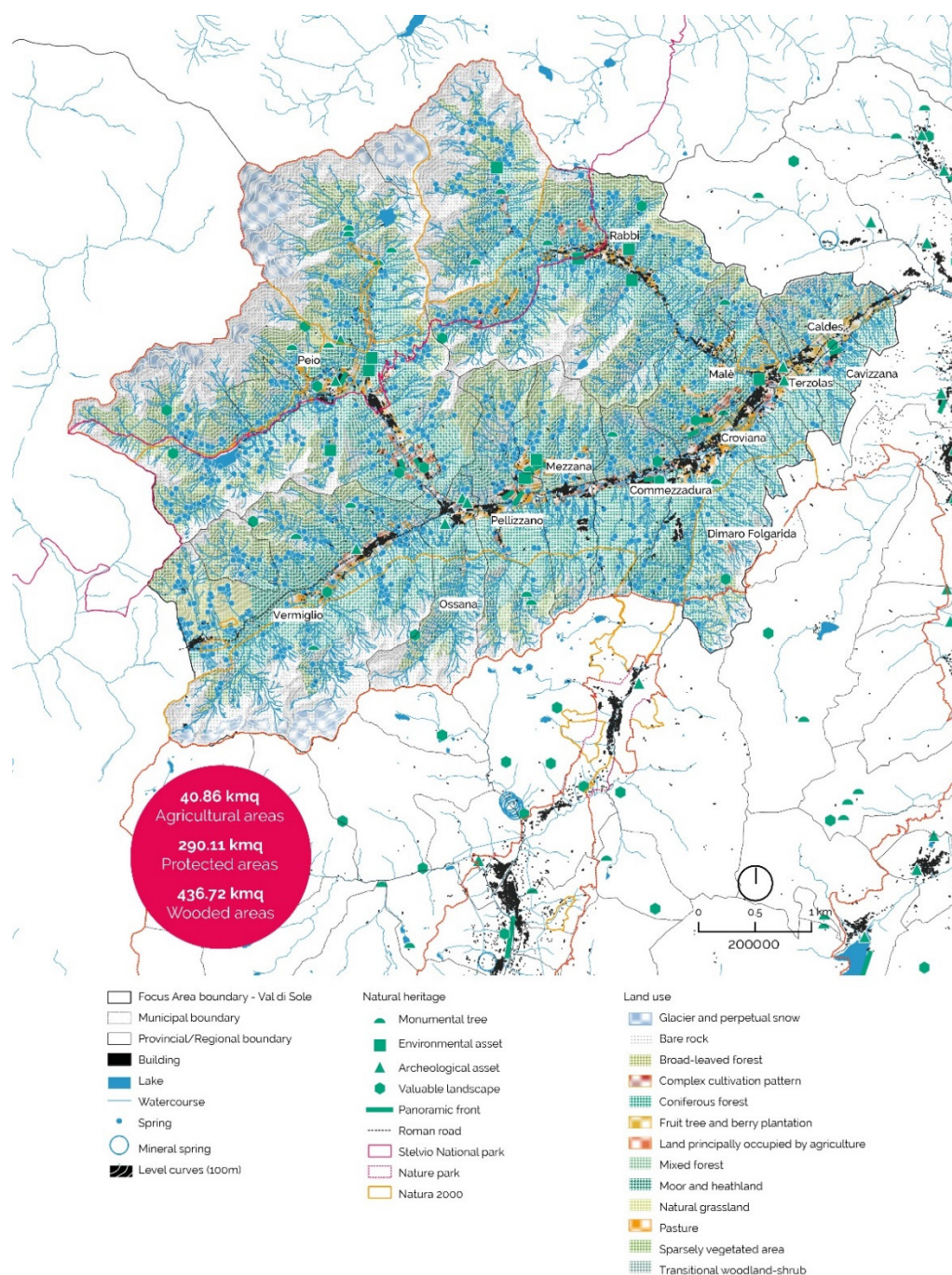
###### 4.1.1. Mapping the Water Landscape

The twenty-one principal maps, elaborated by the University of Trento research unit, compose a work-in-progress atlas. Ongoing phenomena and their imprint on the territory are reported on the maps. These representations present spatial data in a new geographic-spatial form. Through them, it is possible to investigate relationships between different dimensions, such as the correlation between areas at hydro-geological risk and the distribution of old and new settlements or the conformation of the territory in relation to economic and social activities. In the following paragraphs, the most significant maps are reported as illustrative but not exhaustive examples.

The “Natural and landscape heritage” map (Figure 5) identifies the presence of a high natural capital in the valley that provide ecosystem services to humans and are necessary for the survival of the environment itself. Indeed, nearly half of the territory (290 km<sup>2</sup> out of the total 611 km<sup>2</sup>) is subject to protection and preservation measures—including the



Stelvio National Park, the areas of the Noce river, and the neighboring Adamello Brenta Nature Park—and the forest canopy constitutes almost 70% of the entire valley surface. The valley shows a relatively limited spread of built areas, mostly coinciding with the ancient anthropization of the mountains. In 2020 the most urbanized areas corresponded to 1.49% of the entire surface of the valley: the municipalities of Peio and Rabbi show lower values compared to the other municipalities (respectively 0.79% and 0.62%); according to the ISPRA (lit. Istituto Superiore per la Protezione e la Ricerca Ambientale; 2020), in the time frame 2006–2020, the soil consumption (including artificialization, impermeabilization and constructions phenomena) has increased by 4%.

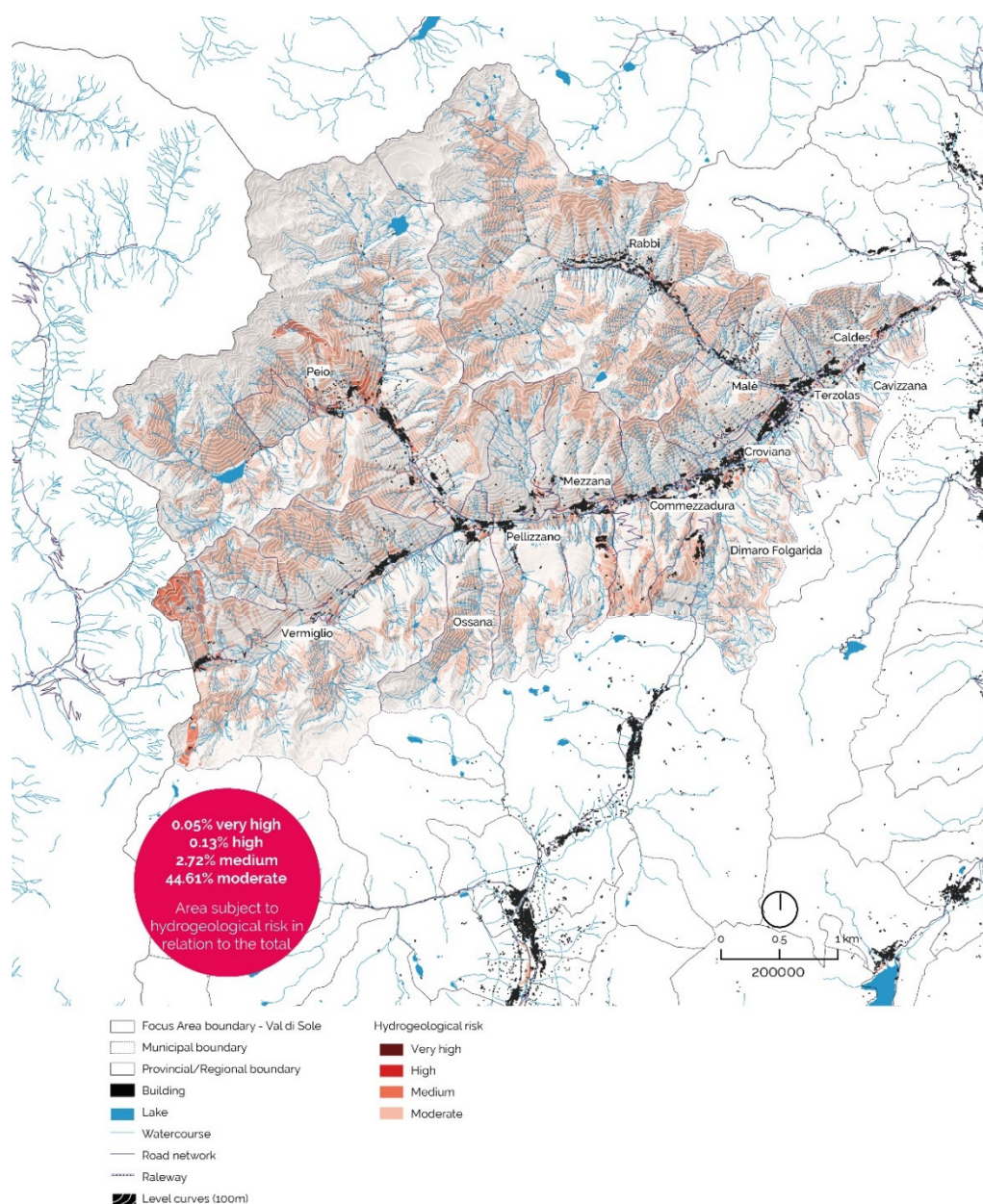


**Figure 5.** The “Natural and landscape heritage” map identifies the presence of a high natural capital in Val di Sole. Coordination Sara Favargiotti, graphic elaboration Chiara Chioni and Margherita Pasquali. Data sources: ISTAT (2019, 2020), CTP (2017), “TINITALY” DEM (2007), CORINE Land



Cover (2018), Geoportale Nazionale (2017), PUP (2019), GeoCatalogo PAT (2010, 2018, 2019). ©Branding4Resilience—UNITN, 2020–2023.

The “Natural risks” map (Figure 6) returns a fragile land characterized by a medium-to-high level of hydrogeological risk (floods, landslides, and avalanches). The water and blue infrastructure systems (i.e., rivers, lakes, glaciers, springs, and thermal waters) are the most precious resources, as well as the cultural and economic values of the territory, but they are also the main source of risks. This condition must be addressed through sensitive planning, design, and maintenance actions at different scales—also involving the abandoned built heritage—by creating awareness and responsibility for the care and protection of the landscape.



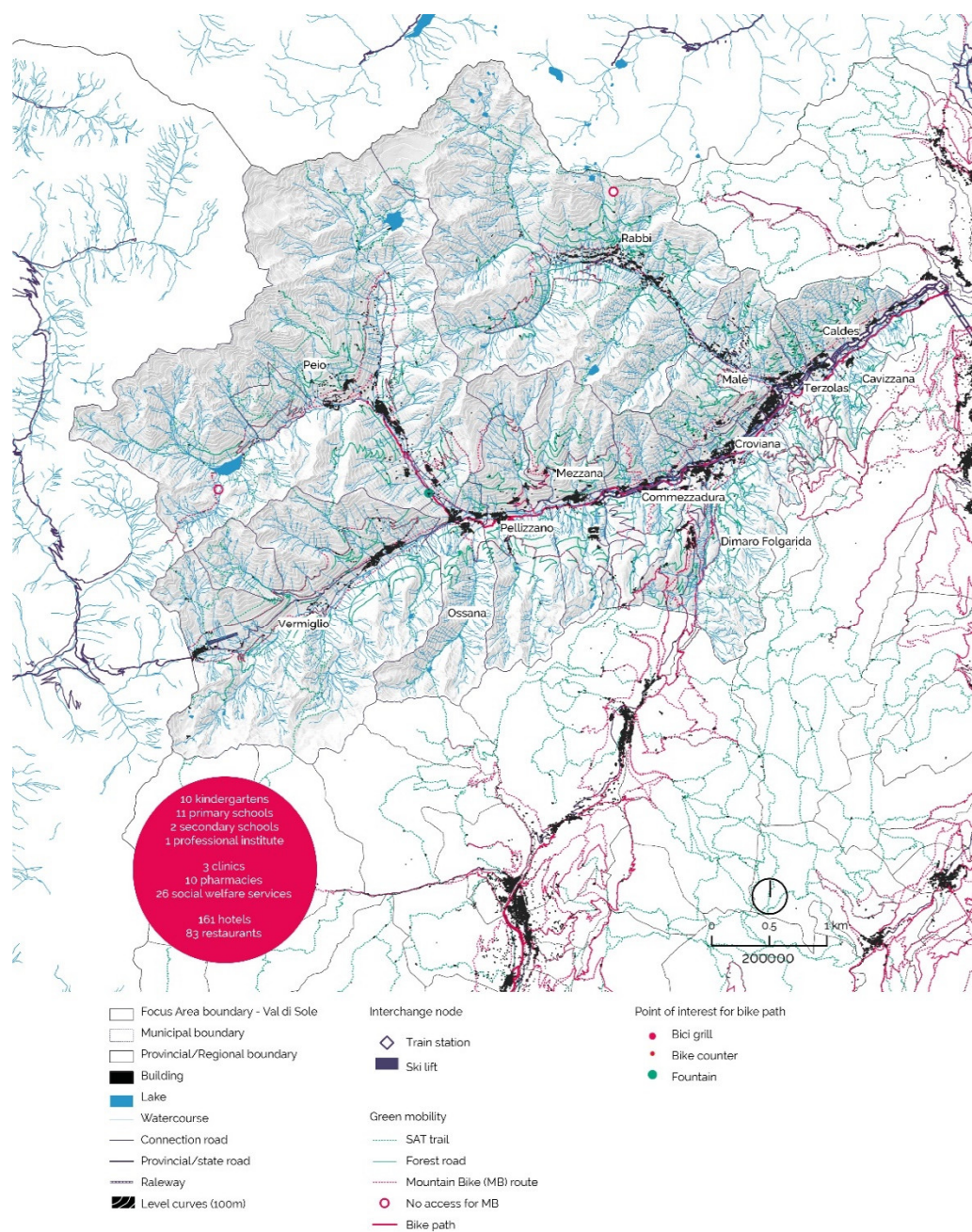
**Figure 6.** The “Natural risks” map shows a fragile territory, characterized by a medium-to-high level of hydrogeological risk (floods, landslides, and avalanches). Coordination Sara Favargiotti, graphic elaboration Chiara Chioni and Margherita Pasquali. Data sources: ISTAT (2020), CTP (2017), “TINITALY” DEM (2007), Servizio Gestione Strade PAT (2020), PUP (2019), Geoportale Nazionale (2013). ©Branding4Resilience—UNITN, 2020–2023.

For the purposes of land use, the Hazard Synthesis Map (lit. Carta di Sintesi della Pericolosità) by the Autonomous Province of Trento—part of the Provincial Urban Plan—identifies areas characterized by different degrees of penalization for the presence of hydrogeological, avalanche, seismic, and forest fire hazards. For Civil Protection purposes, it is important to distinguish between the hazard, represented by the calamitous event that may strike a certain area, and the risk, i.e., the possibility that a natural or man-induced phenomenon may cause harmful effects on the population, residential and productive settlements, and infrastructures, within a particular area, in each period of time.

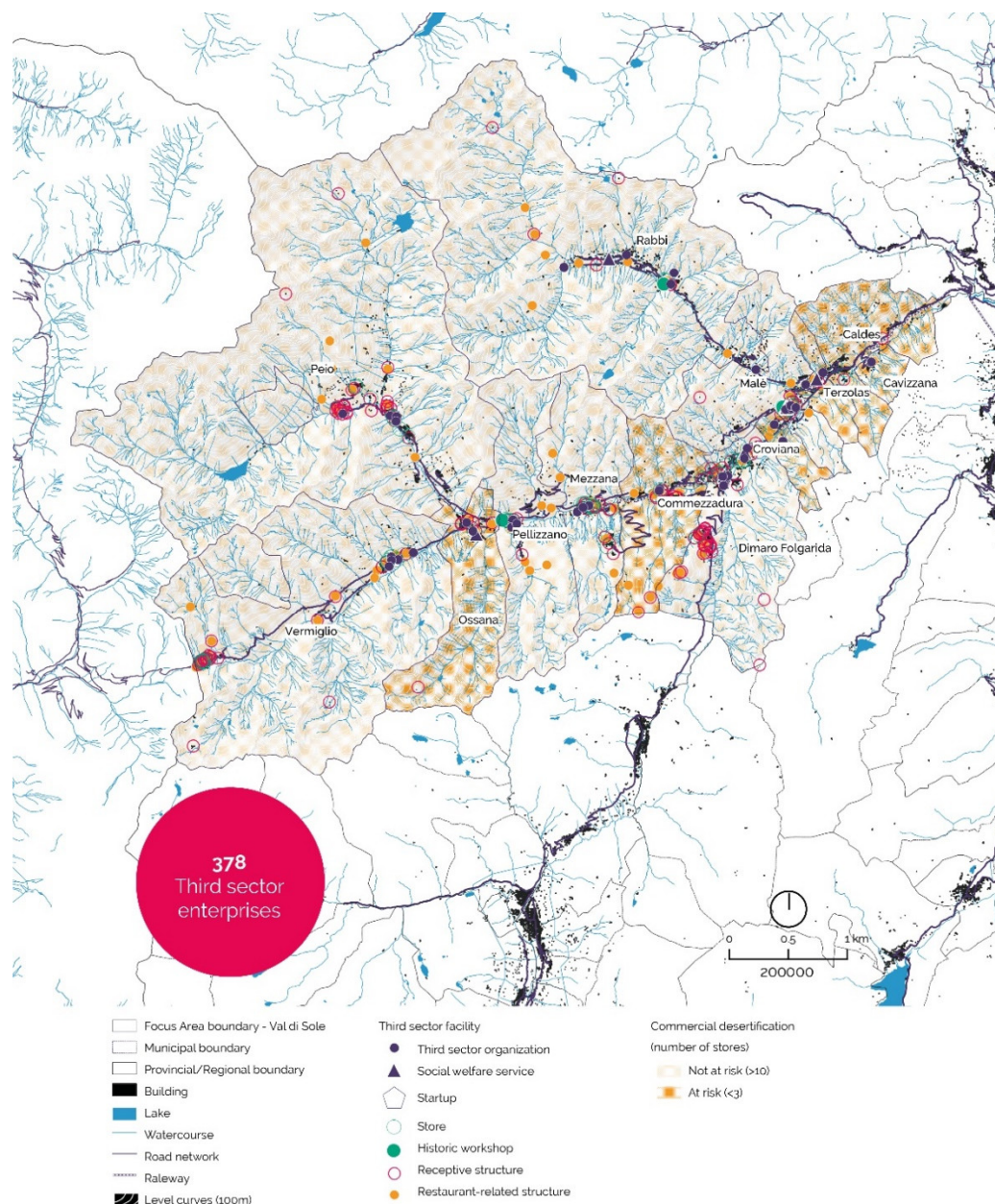
The “Infrastructure network and mobility” map (Figure 7) shows that the Val di Sole is longitudinally crossed by the main road that runs, for a large part, along the course of the Noce river, connecting the other part of the Trento Province (on the East) to the nearby Lombardy region (on the West). The side valleys of Peio and Rabbi are dead-end systems for vehicles, a condition that aggravates their marginality and generates inconveniences during peak tourist season (July–August in summer and December–March in winter; ISPAT, 2019). With the narrow-gauge train, via the Trento-Malè-Mezzana electric railway, the valley can be reached from Trento in about two hours, and the station could be the starting point for the Trentino Trasporti local bus service or the cycle path. The latter, running in the valley bottom, parallel to the Noce River, retraces embankments and ancient country roads. The offer of slow mobility also comprehends trails and mountain routes (traced and maintained by the SAT, lit. Società degli Alpinisti Tridentini), which cover the entire territory and can promote sustainable tourism flows. The railway has been exploited for the laying of cable ducts and fiber optics without impacting the road network, and the connection with the villages is in executive planning: in 2013, 5% of the population was not connected to broadband; nowadays, almost all the hamlets are reached by the ADSL network.

The “Dynamism of the tertiary sector” map (Figure 8) identifies tourism as the leading economic sector, with stability in employment and positive prospects for the future. The tourism tradition of Val di Sole was born around the 17th century as an elite phenomenon linked to curative waters. Since the 19th century, a new form of tourism—mainly linked to the discovery of the mountains, skiing, and wellbeing—has developed, making the valley the third in Trentino Province for tourist presence in hotel establishments (with a presence of about 2.3 million, after the Alto Garda and Ledro community, and the Val di Fassa community; ISPAT, 2019). The SNAI strategic project for the Val di Sole [31] states that the driving force for the future development of the valley will still be tourism, as it has been for the last fifty years. Based on that, in recent years, the territory has aimed to make this sector more sustainable, reconciling tourist development with the protection of the natural heritage. Other important economic resources for the valley are related to the primary sector, with the cultivation of fruit trees and animal farms. Cheese, honey, small fruits, and speck (i.e., cured meat) are the most typical local food products; the Casolet and the Trentingrana cheeses are also Slow Food presidia. Woodworking also represents a traditional local productive sector, and a substantial contribution to the local economy and welfare is produced by the hydroelectric central and the mineral water bottling plant. The companies based on digital, technological, and cultural innovation (e.g., startups, small and medium-sized innovative enterprises) are fewer—compared to neighboring regions and the other B4R inner territories—and limited to Malè.





**Figure 7.** The “Infrastructure network and mobility” map illustrates a valley that is not very infrastructured in terms of heavy mobility but very rich in walking and cycling routes. Coordination Sara Favargiotti, graphic elaboration Chiara Chioni and Margherita Pasquali. Data sources: ISTAT (2020), CTP (2017), “TINITALY” DEM (2007), PUP (2019), Servizio Gestione Strade PAT (2020), GeoCatalogo PAT (2008, 2013, 2019, 2021), OPENDATA Trentino (2013), Azienda per il turismo delle Valli di Sole, Peio e Rabbi SCPA (2021), Vivoscuola (2021), Azienda Provinciale per i Servizi Sanitari PAT (2021), OpenStreetMap (2021). ©Branding4Resilience—UNITN, 2020–2023.



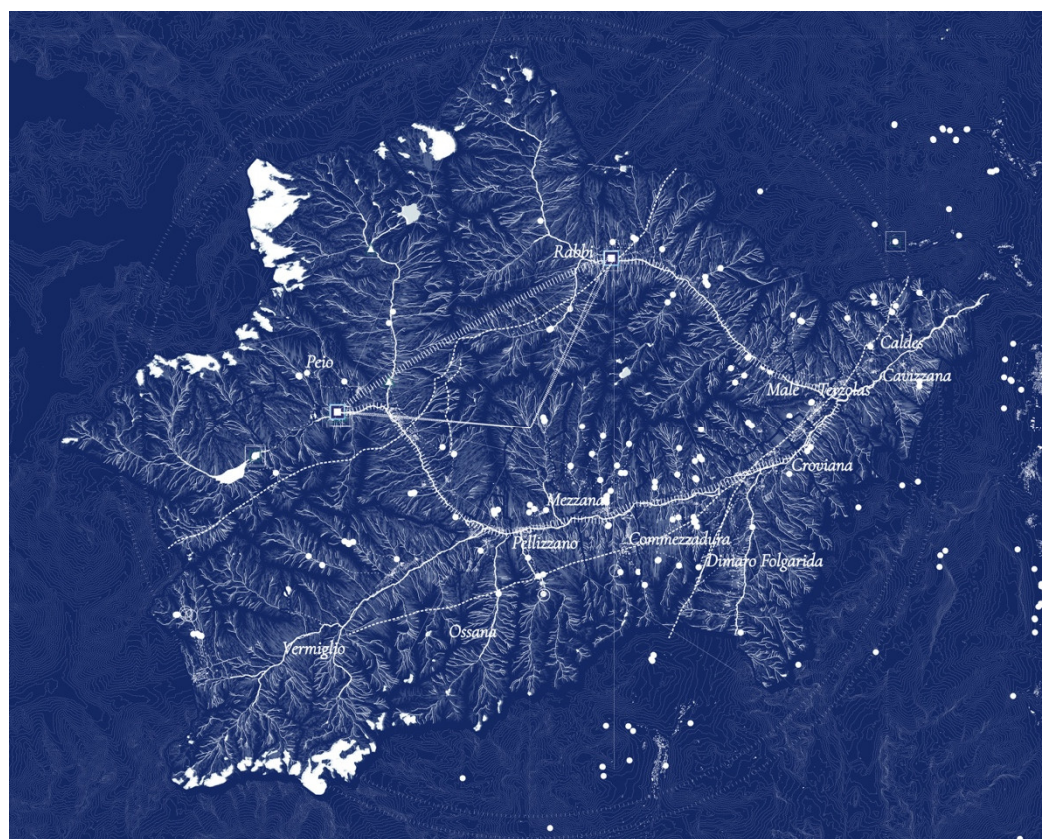
**Figure 8.** The “Dynamism of the tertiary sector” map shows the tourism vocation of the Val di Sole, even at high altitudes. Coordination Sara Favargiotti, graphic elaboration Chiara Chioni and Margherita Pasquali. Data sources: ISTAT (2020), CTP (2017), “TINITALY” DEM (2007), PUP (2019), Servizio Gestione Strade PAT (2020), OPENDATA TRENTINO (2019, 2020), OpenStreetMap (2021), GeoCatalogo PAT (2013, 2016, 2021), Trentinosociale.it (2021), Azienda per il turismo delle Valli di Sole, Peio e Rabbi SCPA (2021). ©Branding4Resilience—UNITN, 2020–2023.

#### 4.1.2. The Val di Sole Blueprint: A Critical Interpretation of the Water Thermal Landscape

Based on the in-depth analysis and understanding of the valley illustrated so far, the University of Trento research team proposed the “Val di Sole Blueprint” (Figure 9) as a conceptual framework: it is intended as an operative tool to navigate the valley with new lenses, and to support coherent and landscape-based design actions towards a new vision for the territory. Indeed, besides the technical meaning of “drawing,” which shows white lines on a blue background—traditionally used in the architecture, engineering, and construction sector—the term “blueprint” can be intended as the preliminary plan for future achievements. Hence, the Val di Sole Blueprint uses the same graphic semiology of the technical drawings to critically summarize the water potential: the hydrographic



network of the territory—enhanced by calculating the watersheds and water flows—leaves a white imprint on the blue land, defining the geography of the valley through a subtraction. The focus area thus appears as an island of a larger archipelago in which the topography becomes the bathymetry. The shapes of water—defined by rivers, lakes, glaciers, and thermal springs—emerged from the drawing as dots and lines of a complex constellation and represent the most precious resources as well as the cultural and economic values of the area (e.g., hydroelectric centrals, mineral water bottling plant, thermal and wellness centers).



**Figure 9.** The “Val di Sole Blueprint” uses the same graphic semiology of the technical drawings to critically summarize the water potential: the hydrographic network of the territory—enhanced by calculating the watersheds and water flows—leaves a white imprint on the blue land. Coordination Sara Favargiotti, graphic elaboration Margherita Pasquali, 2021. ©Branding4Resilience—UNITN, 2020–2023.

In particular, the Blueprint highlights the two thermal areas in the small villages of Peio and Rabbi as the attractive poles of the whole blue infrastructure system: the Val di Sole’s territory is mainly characterized by the massive presence of water springs, valuable resources, and essential parts of the landscape and local identity. Making visible the invisible connections, the map combines the settlements related to the production and use of water and thermal resources with the natural hydrography of the territory. This interpretation suggests the drawing of unknown routes towards the development of a new network able to enhance the natural capital of the area. Finally, the aim of the Blueprint, besides the representation of the interaction between various databases at different scales, is to offer an operative tool to analyze and interpret the territory and to support landscape and architectural design actions. Indeed, reading the fragilities of the area establishes a new “territory of possibilities” [36] on which to act with a resilient strategy toward a new economic model beyond the tourism sector.

The Blueprint map is integrated by a landscape collage-section (Figure 10), following the Andes’ section model by Humboldt [37]: it is an evocative device to visualize and

communicate the interlink among soil, water, and culture, showing the multiple dimensions of soaking into the thermal landscape and in the ground [26]. Operatively, the image aims to interconnect different tangible and intangible aspects of the territory: the temperature, the chemical composition, the mineral underground, the morphology, and the various cultural phases of the Italian “thermalism” [23,24].



**Figure 10.** The landscape collage-section visualize the interlink among soil, water, and culture, showing the multiple dimensions of soaking into the thermal landscape. Coordination Sara Favargiotti, graphic elaboration Margherita Pasquali, 2021. ©Branding4Resilience—UNITN, 2020–2023.

#### 4.1.3. Stakeholder Mapping: A Mutual Exchange among Research and Practice

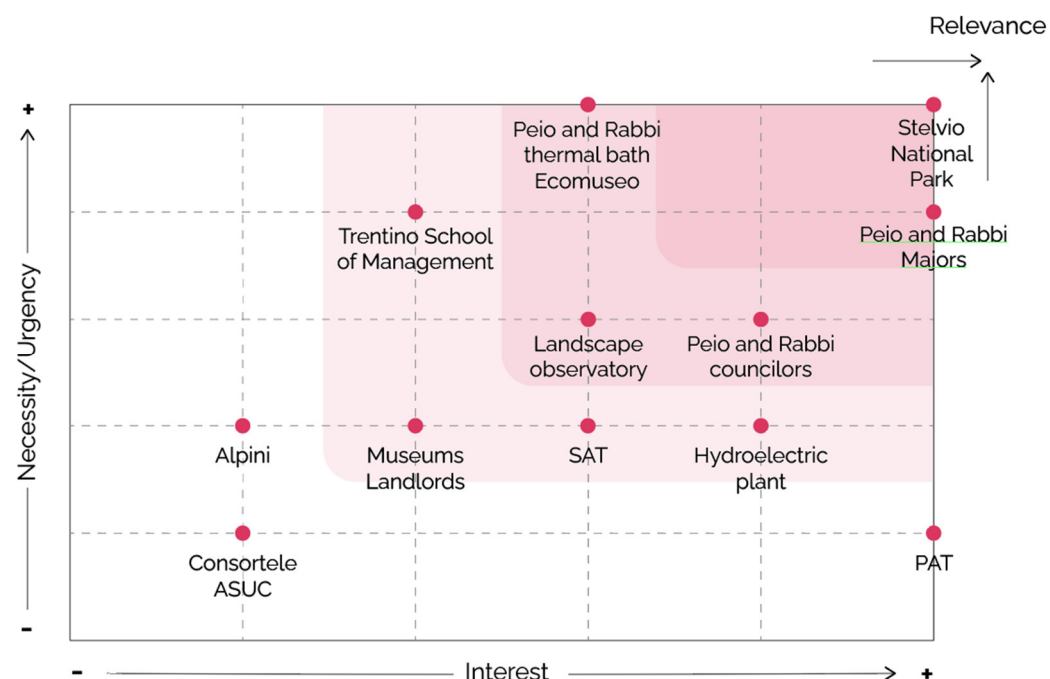
The stakeholder mapping has been conducted to identify the actors who could have specific interests in the four explorative dimensions; then, they have been analyzed and categorized by their influence and decision-making power to identify who should be involved in the last co-visioning phase. The power of the identified actors in the development of public policies depends on their role in the community, their accessibility to resources, and their level of expertise. Their interest in the research project has been considered to promote their participation in the decision-making process.

At the end of the mapping process, 55 main actors were selected: each of them was analyzed in one or more of the four explorative dimensions (Dimension 1 “Infrastructure, landscape, and ecosystems,” Dimension 2 “Built and cultural heritage, and settlements



dynamics,” Dimension 3 “Economies and values,” and Dimension 4 “Networks and services, community, and governance models”) according to their interests and roles within the community and the territory.

By assessing the influence and the need for action within a certain dimension, four charts were developed, allowing us to identify which actors are most relevant in their field. Figure 11 shows the graph obtained for Dimension 1: the Stelvio National Park appears to be the most able to influence the development of landscape policies and one of the major funders of such actions, accompanied by the two mayors of Peio and Rabbi, representing the municipal administrations. Other key players appear to be the two companies that manage the thermal waters, the Autonomous Province of Trento’s landscape observatory and the municipal councilors.



**Figure 11.** Stakeholder interpretation for the Dimension 1 “Infrastructure, landscape, and ecosystems,” the most relevant for the University of Trento research group. Coordination Sara Favargiotti, graphic elaboration Angelica Pianegonda, 2022. ©Branding4Resilience—UNITN, 2020–2023.

#### 4.2. The Co-Design Workshop in Val di Sole

During the co-design workshop, through the exploration of places and the active listening of local actors, the participants from the four research units—with their specific skills, experiences, and external views on the territory—contributed to cultural exchange: with interdisciplinary approaches. They implemented project reflections and proposed real answers to the design challenges raised by the themes presented in Section 3.3. The approach was sensitive, respectful, and oriented to sustainable design in order not to compromise territorial resources but to enhance the identity features of the Val di Sole.

Indeed, the outcomes of the workshop offer a strategic vision, in the form of concepts and operational branding actions, for the sustainable and resilient development of thermal landscapes and resources for inner mountain territories:

1. the “Neighborhood territories” focus group, starting from the plans in place or under discussion (such as the Rabbi valley cycle path, the railway extension, and the Cogolo-Peio funicular), addressed and answered the following design challenges: the promotion of slow mobility, the strengthening and improving intermodality and alternative mobility systems (to contrast private transport), the rethinking of the

flows and timing of tourism, and the promotion of sustainable water management (i.e., use, consumption, production) together with the neighboring territories. The resulting design idea is “RAVIS,” a proposal that adapts the Mobility as a Service (MaaS) model [38] toward future scenarios for mobility in the valley. The survey conducted on the two valleys revealed different critical issues, especially in relation to the land use, mobility, and interconnection between Peio and Rabbi in terms of impacts, timing, cost, and sustainability. This made it possible to find new opportunities that can solve the current situation: the provision of a new slow mobility pathway, the preservation and enjoyment of a car-free landscape, the completion of unfinished infrastructural projects, and a new diversified range of experiences. The RAVIS concept arises by moving edges (or rather thresholds) at different stages, allowing for the adjustment of the slow mobility network over the years and also preserving the landscape from further risk. Combining the MaaS digital mobility model with the spatial design proposal allows the integration of multiple (public and private) collective and shared transportation services, accessible through a single digital platform that offers calculation, payment, and access functions. The service development phases—planning, ticketing, pricing, and incentives—for the app, which brings together local administrators, investors, users, mobility, and tour operators, will complement the development and regulation of future mobility in the area. Possible scenarios are, on the one hand, the enhancement of public road transport, the completion of the bicycle path in Rabbi valley, and the creation of two interchange nodes in Malè and Ossana, and on the other hand, the regulation of private tourist transport.

2. The “Co-creative communities” focus group, moving from the trend topics of wellness tourism, the sustainability of the territory, and cultural dynamism, addressed the following design challenges: the enhancement and promotion of the built heritage (i.e., sawmills, farms, historic buildings, spa facilities, schools), the enhancement and redevelopment of the terraced landscape, the catalyzation of associationism and volunteerism, and the promotion of territorial actions for transvalley cooperation. The resulting design proposal is named “SOLIDARITY MOUNTAIN. Collaborative community network in the upper Val di Sole” after the narrative of a territory that developed wise forms of coexistence and cooperation in the management of collective properties and natural resources. The broad framework of institutional, associational, entrepreneurial, private, and hybrid actors seems to call for a common development vision that overcomes territorial fragmentation and coalesces the energies of the different actors involved. The “Solidarity Mountain” brand is articulated on two fronts, that of the local community and that of external users, which converge in a model of coexistence based on cooperative solidarity, collaborative mutualistic forms, and judicious use of resources. Practically, the project proposes the activation of a network of places (called “Solidarity Mountain Houses”) of transvalley cooperation and cohabitation to be added to the existing system, repurposing underutilized or abandoned public properties. The houses could be strategic territorial devices offered to local actors, institutional and associationism, but also to businesses with strong social characterization. The house proposes a series of spaces with both domestic functions and innovative ways of living: the so-called “community concierge” as an interface between operators and inhabitants and/or external users, offering local welfare services but also information and updates on current projects; the cellar for storage of shared equipment and goods; the garden for outdoor gathering spaces; the *stua* (i.e., the living room), with the fireplace, for dialogue; the kitchen as a 2.0 workshop; the library as a digital and physical archive for the story of the territory; the rooms as spaces for associations.
3. The “New forms of living” focus group starting from the plans for the Peio’s thermal baths, the so-called *ecomostri* (lit. impacting and environmentally damaging buildings, often unfinished or abandoned), and the historic manufacturing buildings,

addressed the following design challenges: the rethinking of temporary, semi-permanent and permanent forms of living, the empowerment towards more sustainable forms of tourism, the enhancement and redevelopment of the thermal built heritage (i.e., spas, fountains), the rehabilitation of the existing with an ecological sensitivity, and the innovation of traditional ways of land management (i.e., civic uses). The context analysis revealed that available accommodations are greater than the demand; therefore, rather than planning new facilities, it could be valuable to diversify and plan the quality of the existing offer through the renovation of abandoned buildings. Nowadays, in Peio and Rabbi, some public facilities are unused, especially during the winter, because of the high management and heating costs. For this reason, the re-functionalization of spaces, connected to the installation of sustainable heating systems, could be appropriate: the promotion of a multi-functionality of spaces would absorb the high running costs and increase the territorial offer. Reference can be made to the building housing the Rabbi spa, which is currently used for only a few months a year since the current gas system is not economically and environmentally sustainable. The analysis also showed a winter concentration of tourists in Peio valley and a summer concentration in Rabbi valley: this leads to obvious stress for the territory, which is subject to peaks of affluence followed by periods of stagnation. The design proposal “SempreVIVO” plans a tourist season that is more spread out over the year, allowing for a decrease in the impact on the territory and more sustainable use of resources. The community involvement in the project could highlight local peculiarities that are not yet known, developing a new way to represent the territory (i.e., a new territorial brand). The objective is to achieve a balance of presences throughout the year and a better spatial distribution of visits to reduce stress in certain areas, made particularly famous by social networks. The distribution of interactive information by totems could contribute to the dissemination of knowledge, the presentation of the local resources, and the education of tourists in experiencing the territory in a sustainable and balanced manner.

Across all these strategic concepts and design ideas, the natural capital, with its wide variety of natural assets (i.e., plants and animal species), has emerged as the common ground. In Val di Sole, the thermal water landscapes could become the backbone for tackling water risks and enhancing natural ecosystems.

## 5. Discussion and Final Considerations

The place-based approach tested and proposed by the authors in this manuscript could offer a more sensitive and responsible awareness to govern inner territories and to accompany local actors (i.e., public and private institutions, and associations) in designing future strategic scenarios. By collaborating with them, research institutions—with their specific skills, experiences, and external views on the territory—might contribute to activating a cultural exchange, implementing project reflections with interdisciplinary approaches, and proposing innovative answers to design challenges. With this regard, the experimental research in Val di Sole—within the “B4R Branding4Resilience” project framework—promotes a participatory design and planning approach. This outlines an operational strategy based on the inclusion of the local community, aware of the mountain territory’s potential and limitations [4]. Shifting from global to local perspectives allows us to drive a more sustainable design in order not to compromise resources and enhance territorial features. The exploratory design has experimented with how reading territorial fragilities and resources (e.g., natural and anthropic risks, water features, built heritage, protected areas) allows the promotion of innovative and resilient design strategies that must also respond to the need for a new economic model, not only related to the tourism sector. Design tools—such as strategic scenarios, conceptual framework, and operative branding actions—could effectively support the definition of actions to cope with the

challenges through innovative and unforeseen approaches. Indeed, the “Val di Sole Blueprint”—by making visible the invisible connections related to water resources—represents an operative design tool to analyze and interpret the territory. Furthermore, it suggests a new network that enhances the natural capital of the inner territories towards the development of new landscapes and architectural design opportunities.

More specifically, the exploratory mapping and design described in this manuscript highlight three fundamental interweaved aspects of the territory: landscape (narrative and cultural), ecological (ecosystem processes), and environmental (individual components of water, air, and soil). The outcomes of this experimental process offer a strategic vision in the form of operative branding actions for the sustainable and resilient development of thermal water landscapes in inner mountain territories. Across these strategic concepts and design ideas, the natural capital—with a wide variety of natural assets (i.e., plants and animal species)—is conceived as the common ground. Here, the thermal water landscapes could become the backbone for tackling water risks and enhancing natural ecosystems. To cope with the territorial challenges in the Val di Sole, a series of actions emerged according to three main design scenarios:

Managing the proximity:

- promote sustainable water management by negotiating its use, consumption, and production with neighboring territories;
- strengthen alternative, diversified, “on-demand” mobility systems;
- rethink the flows and timing of tourism towards the diversification in time for a non-seasonal and sensitive adaptation of demand (against a “tourism-peaking” effect).

Enhance co-creative communities:

- enhance and redevelop the existing built and landscape heritage (e.g., schools, dry stone walls);
- innovate traditional modes of land management (e.g., civic uses, consorte) with a multilevel governance framework;
- promote territorial actions and initiatives for transvalley cooperation.

Promote co-habitation:

- rethink the forms of temporary, semi-permanent and permanent living;
- empower more sustainable forms and modes of tourism for a better balance among humans and earth others;
- reclaim the existing with ecological, energy and landscape sensitivity.

The in-depth and holistic survey of the Val di Sole territory—based on the variety of tools described above—spatially represents the relationship and interlinks among tangible and intangible features: landscapes, ecosystems, infrastructure, and built heritage with environment, economies, communities, and policies. Looking at the territory through this integrated and multidisciplinary lens constitutes an essential aspect of inner territories exploration and planning that very often is lacking in the local and national policies. In the focus area of Val di Sole, we promote a strategic approach where these features—by being mapped, analyzed, and interpreted through qualitative and quantitative components—should be included in decision-making processes as performative assessment parameters (e.g., Urban Plans, Mobility Plans, Strategic Environmental Assessment (SEA) Plans and Directives, Landscape Charts, Risk and Vulnerability Charts) [39]. Indeed, landscape encompasses more than one aspect [40]: it is a certain part of the territory derived from the actions and the interrelationships of human and natural factors [41]; it embeds everything around us [42,43], giving importance to taking care of each places’ transformations. For these reasons, it is crucial to understand how to integrate landscape into spatial design and planning policies—including risk and vulnerability plans, mobility policies, and physical and digital infrastructures’ design processes—along with the cultural, environmental, agricultural, social, and economic aspects that influence the landscape.

### *Limitations and Outlooks*

The cohesion policies have addressed the problem of areas with territorial imbalances only partially: most of these are still at risk, with climate and social-spatial vulnerabilities bringing further uncertainty over their capacity to achieve sustainable development. The value of natural resources, the contemporary interpretation of ancient processes to manage the land, and the innovative practices to take care of landscape and building heritage should be considered in “quality of life” evaluations. The “B4R Branding4Resilience” project approach proposes a territorial brand that promotes resilience, as it is regenerative and adaptive, whose change’s processes and subsequent benefits are to be assessed through community inclusion to preserve the local identity of the areas and—in the case of the University of Trento’s focus area—to renew the historic wellbeing tourist offer.

An interdisciplinary and multiscale methodology has been adopted to combine qualitative and quantitative approaches: a data collecting process is used to explore the natural identity of the Val di Sole to contemplate both ecological and spatial elements such as physical and immaterial qualities, weaknesses, and the needs of local communities. The creation of a first atlas of thematic maps and of a synthetic portrait map, exploring the potential of the territory, allows the complexity and dynamism of the territory to be visualized, supporting the creation of a territorial brand. The effective usage of the maps to support participative planning actions was directly assessed by experts and citizens during workshops, seminars, and meetings.

Starting from the synthetical, recognizable, and brandable image of the “Val di Sole Blueprint,” it could be easier for the involved stakeholders to read the exploration phase, interpret the theoretical concepts developed by the research and directly participate in the collaborative multilevel strategic planning and design of the territory. In the next phases, the conceptual framework will be further developed to support a coherent and landscape-based design strategic plan. In any further transformations of the valley, the natural capital is the narrative and the feature to be preserved and taken care of for a more equal and just human-nature interdependence and cohabitation.

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