Integrated coast-inland patterns in Liguria: ecosystem services between plans, policies and innovation

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The present study focuses on the relationship between the coast and the inland within the context of the Liguria region with the aim of formulating a representation based on integrated physical-spatial patterns capable of providing possible answers to the urban-social and ecosystem-environmental issues. The research identifies two contexts of analysis - one in the east and one in the west - that are representative of the critical and fragile

Methodological flowchart

In the last decade, national policies - such as the National Strategy for Inner Areas (SNAI) and more recently the National Recovery and Resilience Plan (NRRP) - have focused on the issues of development and spatial cohesion, marginalisation and demographic decline, in terms of accessibility, services and development, with the aim of identifying a support strategy capable of combating the 'demographic haemorrhage' in the most vulnerable areas of our country. The actions identified are intended to promote an operational approach aimed at: protecting the heritage, maintaining a minimum level of provision services (including ecosystem services), developing economies supported by local communities, enhancing natural and cultural resources, promoting new employment cycles and creating new opportunities.

This paper focuses on the context of the Liguria region, from the coast to the inland, with the aim of testing how the application of integrated physical-spatial patterns can provide possible solutions to

phenomena of the entire region, from which it analyses and restores at a spatial level the ecosystem qualities and the degree of innovation that the landscape is capable of producing, in order to understand to what extent strategic planning and the investments generated by recent governance policies generate, reflect on the territorial ecosystem in terms of environmental quality, economic-productive development, socio-cultural dimension and political-technological innovation.

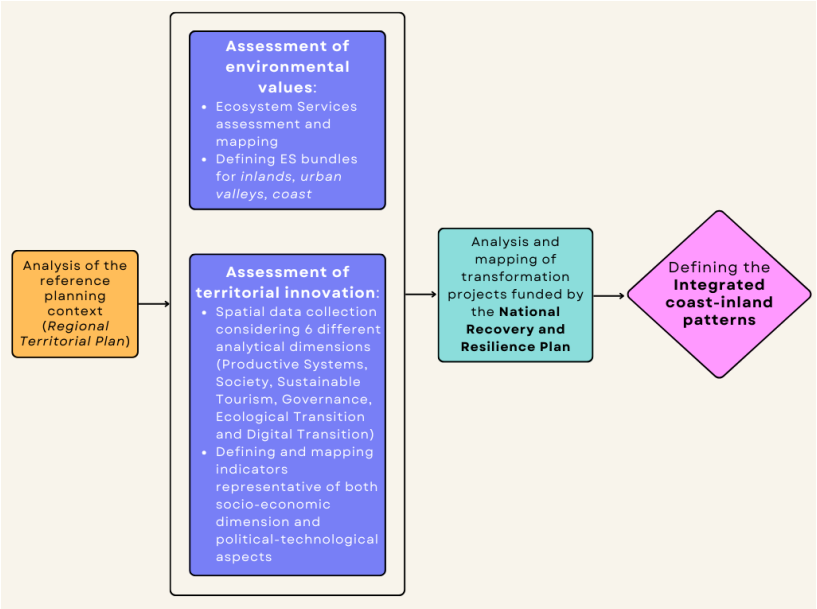
the urban-social and ecosystem-environmental issues.

The study is part of the cycle of research already carried out on the Ligurian region, focusing on relevant aspects such as the strong polarisation between the coastal conurbation and the inland areas (Lombardini et al., 2022, 2023; Tucci, 2019). Indeed, the article aims to explore how an integrated and systemic vision can promote new development opportunities, assuming a different orientation of the anthropic-environmental structure, enhancing the valley systems (instead of only the urban coastal axis) and implementing the spatial ecosystemic multifunctionality.

The geographical, demographic and socio-economic characteristics of the Ligurian region make it a complex area. The demographic and socio-economic imbalances of recent decades have accentuated the polarisation between the coast and the inland, as well as urban and landscape transformations have profoundly altered the old settlement patterns. The land consumption generated by mass tourism infrastructures has subsequently aggravated the crisis caused by the overexploitation of environmental resources and affected the urban development model (Lombardini, 2017).

Despite the Liguria geomorphological fragility and the difficulties of accessibility and marginalisation, the region continues to represent a strategic area in terms of the important Mediterranean trade and infrastructure corridors (such as port systems). Given its key role, the Liguria region is involved in both the EU strategies for the Alpine region (EUSALP) and the Mediterranean region (EUSMED).

The research analyses this area through a spatial analysis of environmental values, ecosystem services, and urban transformations, following an initial study of the reference planning context. The aim is to highlight the spatial mismatch and to formulate a representation based on integrated models capable of providing possible answers to the urban-social and ecosystem-environmental issues (see Fig. 1).



Methodological flowchart
Credit: A. Pilogallo, 2023
Fig. 1

The main objectives of the research can be summarised as follows:

- Redefine the physical-spatial context of ecosystem services and related spatial mismatch;
- Formulate a spatial representation based on integrated patterns capable of providing possible answers to the urban-social-environmental issues;
- Understand how strategic planning and investments generated by recent governance policies reflect on the territorial system in terms of environmental quality, economic-productive development, socio-cultural dimension and political-technological innovation.

Legislative framework and policies

The current morphological structure of Liguria is characterised by a rift between the coast and the inland, with a high density of urban settlements, mainly along the coastal and valley axes, contrasting with a significant depopulation of the inland, characterised by the progressive ageing of the population and the constant loss of local services essential to daily life. Predominantly rural, inland communities have poor links with urban areas and difficult access to services of general interest, leading to a spiral of decline and abandonment in these contexts[1].

For almost half a century, this marginalisation, especially in the inland and mountainous areas, has led to a progressive and unstoppable demographic crisis - which has now reached exceptional proportions in the European context - giving Liguria the record of being the oldest region in Europe, with a very low working population.

In order to respond to the needs of the political and planning framework - expressed in the recently adopted Regional Territorial Plan (RTP) - has therefore defined a series of actions aimed at promoting a new development orientation for the landscape and the environment (Lombardini, 2023).

In particular, the RTP has carried out an analysis of the regional framework starting from its artic-

ulation into cities, coastal conurbations, urban valleys, poles of attraction and inland areas. This analysis is based on the identification of critical and fragile phenomena in the regional landscape and focuses mainly on three axes:

Erosion of rural areas, abandonment of agricultural activities and encroachment of the forest with further depopulation of the inland and consequent abandonment of land and loss of biodiversity;

Urban decay and functional deficiencies in the settlement structure, with a progressive decline in the competitiveness and quality of life offered in urban contexts, and consequent depopulation of the more inland and less accessible areas in terms of services, infrastructure and employment;

Anthropogenic pressure and consolidation of settlements along the coastline, loss of natural and agricultural spaces and the associated artificialisation and sealing of the soil.

On the basis of the analysis presented by the RTP, two areas of the region representative of the vulnerabilities highlighted by the plan analyses were analysed.

Rich in elements of the physical, human and patrimonial geography of the Ligurian region, these areas form a strategic junction between the coast and the inland that can well represent the process of anthropisation that has affected the entire region on a larger scale.

In this sense, the study therefore focuses on 2 macro-areas (one in the west and one in the east of Liguria) that can include municipalities belonging to the three different areas identified by the PRT: (1) Inland, (2) Urban Valleys, (3) Coast (see Fig. 2).

To the east, the Antola-Tigullio-Fontanabuona area [1]includes:

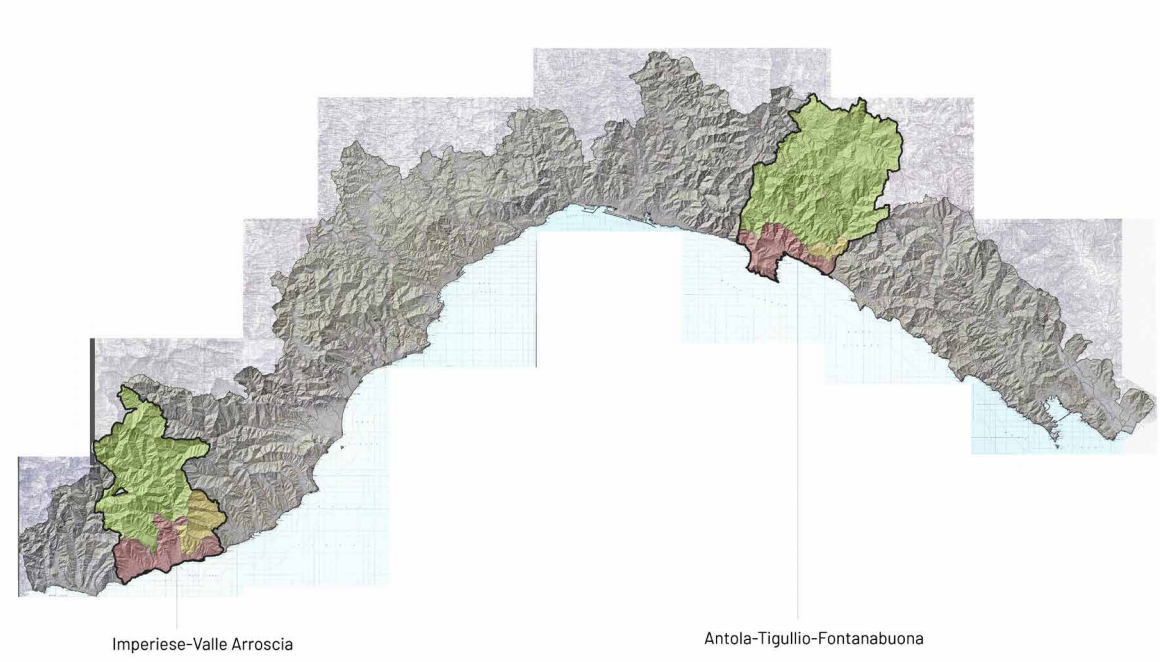
- Part of the inner area of the Valli del Levante, subject to the problems identified in Axis 1;
- A group of municipalities in the urban valleys, subject to the problems identified in Axis 2;
- Part of the urban centres of the coastal area, subject to the problems identified in Axis 3.

While to the west, the area of analysis is the Imperiese-Valle Arroscia [2]includes:

- Part of the inner area of Imperiese and Valle Arroscia, subject to the problems identified in Axis 1;
- A group of urban valley municipalities, subject to the problems identified in Axis 2;
- Part of the coastal urban centres, subject to the problems identified in Axis 3.

After identifying the two study contexts, three analyses were developed:

- First analysis related to the provision of delivered ecosystem services (see Chapter 3 and Fig. 2);
- Second analysis related to the level of spatial (urban-landscape) innovation (see Chapter 4 and Tab. 1);
- Third analysis related to the policies and strategic projects underway in the analysis areas (see Chapter 4 and Fig. 3).



Building the knowledge framework

Environmental values and ecosystem services

The first component of the context analysis aims to represent the multifunctionality, as a proxy for the overall environmental performance, of three different areas identified by the RTP. The multifunctionality approach, which aims to express in a synthetic way the capacity of ecosystems to deliver multiple benefits for human well-being (Garland et al. 2021), is gaining increasing interest in the scientific production related to urban (Salata and Grillenzoni, 2021; Cortinovis and Geneletti, 2020) and spatial planning (Isola et al., 2022; Mitchell and Devisscher, 2022). The reason lies in the possibility provided by this approach to relate the environmental performance characterising an area to spatial indicators representative of anthropic pressure (Pilogallo et al., 2022), urbanisation processes (Bomans et al., 2010; Li et al., 2023) and, more generally, land use changes (Mastrangelo et al., 2014).

The ecosystem services methodological framework has shown great potential to support sustainability-oriented decision-making (Scholes et al., 2013), as it bridges ecological functions and societal interests. Limitations to its full implementation are related to the difficulty of understanding how multiple ecosystem services interact with each other in complex and changing environments (Spake et al., 2017; Villamagna et al., 2015). Raudsepp-Hearne (Raudsepp-Hearne et al., 2010) addressed this issue by proposing an approach based on "bundles" defined as "a set of ecosystem services (ES) that repeatedly occur together in space or time" and aimed at identifying consistent associations of ES that can characterise the multifunctionality of a given landscape.

The success of ecosystem services bundles in the body of scientific literature related to spa-

Study macro-areas: west Imperiese-Valle Arroscia, east Antola-Tigullio-Fontanabuona
Credit: G. Lombardini, 2023
Fig. 2

tial planning, landscape management and land use policy (Cord et al., 2017; Geijzendorffer et al., 2015) lies in their potential to inform decision making about the trade-offs and synergies that occur across space and time, and to address sustainability issues by identifying opportunities for management improvement in alternative policy options (Saidi & Spray, 2018). In this work, we used ES bundles to show the differences in ES multifunctionality of inland, coastal and urban valleys, as they are characterised by different spatial patterns of built-up areas, infrastructure and land, whichdynamically imply a change in ES patterns (Mugiraneza et al., 2022) (see Fig. 3).

For this reason, the selection of ES is motivated by the need to represent the environmental values - also taking into account the ability to face global challenges such as climate change (Balzan et al., 2018; Battisti et al. 2020; Geneletti & Cortinovis, 2021), the agricultural and productive vocation and the tourist attractiveness:

Regulation of the chemical composition of the atmosphere (and oceans), considering a dual contribution related to both carbon stock and CO_2 uptake. Both the two components of the carbon cycle (Chapin et al., 2006) were assessed using the InVEST Carbon model (Babbar et al., 2021; Nel et al., 2022);

Pollination, calculated by the mean of the InVEST Pollination model, which takes into account the availability of nesting sites for pollinating insects and the distribution of floral resources across the landscape (Davis et al., 2017) to calculate the presence of pollinating insects in a probabilistic manner (Wentling et al., 2021);

Habitat quality, representative of the spatial distribution of biodiversity (Ding et al., 2021) as a result of the interaction between anthropogenic and natural components (Pilogallo et al., 2022);

Crop production, calculated by a climate-driven model included in the InVEST model suite (Monfreda et al., 2008), capable of spatially estimating potential crop yield for a range of crops, derived from a user-provided land cover information layer (Mueller et al., 2012);

Water yield, relevant to the ability to harvest rainwater and make it available for drinking purposes. This ES has been calculated using the experimental Budyko equation (Marlatt et al., 1975) based on average annual precipitation layers;

Control of erosion rates, obtained by the RUSLE equation implemented in the InVEST Sediment Delivery Ratio (SDR) model (Gashaw et al., 2021) and relevant for the ES related to soil conservation (Guo et al., 2023);

Water purification, assessed using the Nutrient Delivery Ratio (NDR) module of InVEST, which maps the source and transport process of nutrients at the river basin scale (Yang et al., 2019), thus representing the water filtration capacity of different types of vegetation cover (Li et al., 2022);

Recreation, as a proxy for tourism attractiveness.

For this purpose we used the InVEST Recreation model based on crowdsourced photographs and often used to investigate how recreational benefits are affected by changes in ecosystem quality (Sinclair et al., 2018) or under specific scenarios (Manley & Egoh, 2022).

Spatial innovation

The second analysis aims to define and identify the elements capable of providing spatial innovation, understood not only in physical-geographical terms, but also as a *socially constructed relational sphere* (Asheim & Coenen, 2005) where processes of economic (economic growth, income, employment, etc.), human and social (education, quality of life, etc.) and environmental (protection, biodiversity, etc.) development take place together. We consider urban processes as a complex system involving several factors such as governance and public administration, politics, education, culture, religion, scientific and technological research, health, transport, trade, industry, tourism, security, commerce, communications, etc. From this perspective, innovation is also spatially distributed in relation to several contextual features, such as economic conditions, resources, variables affecting risk acceptance and perception, socio-cultural values and interests.

In order to measure quantitatively measure the degree of innovation of the two selected macro-regions, a set of indicators has been defined on the basis of the strategic objectives of Europe 2020 (EC, 2020): knowledge economy, inte-

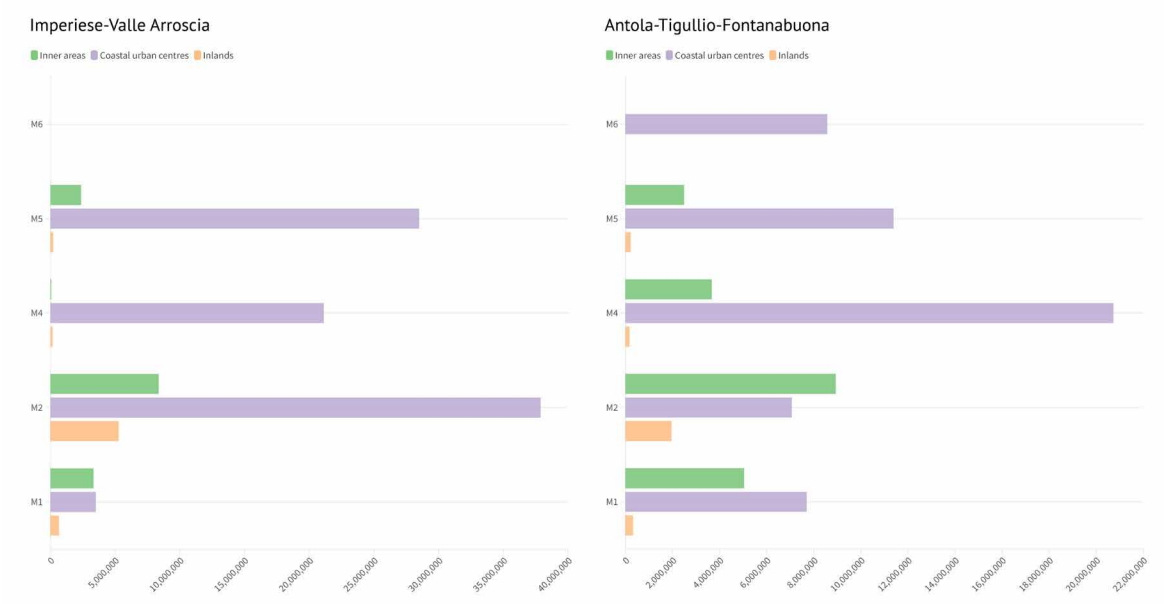
Ecosystem services of the two study areas

Credit: A. Pilogallo, 2023
Fig. 3

Indicators of spatial innovation

Credit: G. Tucci, 2023
Tab. 1

Production systems	SP1. Multifunctional agriculture	Innovative farms Organic and biodynamic farms Farms and social enterprises Educational farms
	SP2. Agro-productive circuits	Bio Districts Agricultural consortia Food and wine circuits (slow food, network of companies) Quality certifications (Mountain Product, SQNPI, DOC, DOP, IGT)
Society	SO1. Landscape identity	"Borghi storici" awards "Borghi più belli d'Italia" awards "Bandiera arancione"awards
	SO2. Socio-cultural actions	Biodiversity Ecomuseums Community houses (health) Community hospitals (health)
Sustainable tourism	TS1. Innovative accommodation	AgriBio Tourism Eco BnB AgriCamping Diffused Hotel
	TS2. Outdoor tourism	Alta Via dei Monti Liguri' and 'Rete Escursionistica Ligure' hiking routes Ligurian Cycle Network' cycle routes
	TS3. Experiential tourism	Food and wine routes "Le Strade dell'olio" and "Le Strade del Vino"
Governance	GO1. Redevelopment and regeneration	PINQuA projects (National Innovative Plan for Quality Living) Europa Nature projects
	GO2. Management and protection	Park Areas (Park Plans) SCI and SPA areas (Management Plans) Ecological corridors River contracts Protected areas
Ecological transition	TE1. Ecology and energy sustainability	Renewable energy communities Projects for ecological transition
Digital transition	TD1. Digitisation	Digital connectivity network Innovative start-ups



Total funding received per municipality from the NRRP
Credit: A. Pilogallo, 2023
Fig. 4

grated spatial approach, valorisation of natural resources, landscape and biodiversity, multifunctional agriculture, sustainable tourism.

Specifically, six analytical dimensions were selected: Productive Systems (SP), Society (SO), Sustainable Tourism (TS), Governance (GO), Ecological Transition (TE) and Digital Transition (TD), from which a matrix was constructed with all the available information at the municipal level. The indicators were then grouped into two thematic areas:

Socio-economic, consisting of 7 indicators, covering aspects related to multifunctional agriculture, agro-productive cycles, socio-cultural actions and sustainable tourism;

Political-technological, consisting of 4 indicators, describes aspects related to governance policies, energy systems and digital networks (see Table 1).

On the basis of this classification, a 100-metre grid was constructed to represent the spatial distribution of each innovation dimension. Spatial data were collected at municipal and regional level (tourism networks, cartographic portals of protected areas, regional spatial plans, data from the Liguria Chamber of Commerce) as well as at national level (certifications, national funding plan). The final rating of the degree of innovation (very low, low, medium or high) in Figure 5 is given by the number of criteria fulfilled, i.e. the total number of layers falling within the same spatial grid cell.

Investments and transformation projects

After finalising the knowledge framework in terms of environmental values and spatial innovation characteristics, we carried out a survey of projects and interventions funded by the National Recovery and Resilience Plan (NRRP)[3], an instrument created by the European Union

as a consequence of the pandemic crisis and being part of the Next Generation EU (NGEU) programme.

It aims to accelerate the ecological and digital transition, improve the training of workers and achieve greater gender and generational equity through new investments, reforms and concrete actions.

The two main instruments established by the NGEU are: the Recovery and Resilience Facility (RRF)[4] and the Recovery Assistance for Cohesion and the Territories of Europe (REACT-EU).

The RRF required Member States to submit a package of investments and reforms: the National Recovery and Resilience Plan (NRRP) divided into six missions and 16 components.

The six missions are: digitalisation, innovation, competitiveness, culture and tourism; green revolution and ecological transition; infrastructure for sustainable mobility; education and research; inclusion and cohesion; and health.

The Plan, in line with the six missions, respects the parameters set by the European regulations on quotas for 'green' and digital projects.

Since the effects of implementing such reforms and investments are likely to be relevant, we propose a spatially explicit comparison of environmental values, levels of innovation and investments in the NRRP. For this purpose, we compiled a dataset in a GIS environment that collects the amounts financed for every Mission in each of the municipalities included in the two study areas (Fig. 4).

Qualitative representation of integrated coast-inland patterns

The analysis of the 8 ecosystem services considered within the two study areas provides a rather intuitive scenario of the overall environmental quality of the three different clusters (Inland, Urban Valleys, Coast).

As can be seen in Figures 2 and 4, for both study areas, the highest environmental ecosystem values are distributed in the inland areas, which are characterised by mountainous areas and predominantly forested and densely vegetated land cover, low anthropogenic pressure and geomorphological factors that have contributed to limiting the development of human settlements and the spread of urbanisation processes.

On the other hand, the lowest values are to be found within the coastal cluster characterised by densely urbanised areas, where the highly fragmented settlement and production system, the massive use of intensive farming practices (spatially contiguous with urban areas) and the high density of mobility infrastructures contribute with different weights to determining low environmental performance.

However, in contrast to the inland areas and urban valleys, Recreational Ecosystem Services (RES) - which are an important class of Cultural Ecosystem Services (CES) as they provide benefits to people through improved physical health and psychological and emotional wellbeing - are largely localised in coastal communities and very limited in the inland areas.

With regard to the degree of spatial innovation mapped by the indicators described above, a fragmented distribution of innovation systems within the study areas is quite evident, with a greater concentration of innovation levels in the inland areas, especially in the Antola-Tigullio-Fontanabuona area, thanks to the creation of the new bio-districts (Val di Vara bio-district and Alte Valli bio-district), where a variety of innovative actions linked to the tourism and agro-production sectors are concentrated.

Even along the eastern coast, in the municipalities of Camogli, S. Margherita and Portofino, a first level of innovation can be detected, linked to the launch of environmental regeneration projects and the presence of biodiversity in the protected park areas.

It is also significant that the concentrations of activities coordinated or supported by public institutions (such as regional parks or the pilot areas of the SNAI strategy) coincide spatially with the areas with the highest production of ecosystem services (Lombardini, Tucci, 2022).

This coincidence suggests the hypothesis of a possible effectiveness of these policies or, at least, of the central role that even simple protection and conservation measures can play in the provision of ecosystem services.

Finally, with regard to the analysis of plan funding, as can be seen from the map of funding received by the NRRP (see Fig. 5) and the linear graphs of the relative missions (see Fig. 4), the two clusters of coastal municipalities (east and west) are the beneficiaries of a significant component of plan funding compared to the urban valleys or inland areas.

On the coast, funding is mainly concentrated in the leading municipalities/attraction poles such as Sanremo and Taggia in the west and Rapallo and Chiavari in the east.

In particular, in the Imperiese-Valle Arroscia area, the majority of the projects financed in the coastal cluster belong to Mission 2. Green Revolution and Ecological Transition, with actions aimed at sustainable agriculture, energy transition, green mobility and the protection of water resources; while in the Antola-Tigullio-Fontanabuona area, the majority of the funds received go to projects related to Mission 4. Education and Research, with actions aimed at improving the provision of educational services (kindergartens, schools, universities, research and training).

Comparing the graphical restitution of the ecosystem analysis of the two areas, we can see that it is necessary to implement actions aimed at competitiveness, sustainability and spatial innovation is consistent, in order to reduce the ecosystem mismatch between the coastal areas, which are currently in ecological deficit, and the inland areas, which play an important role in the provision of basic ecosystem services (especially in the water, air and biodiversity sectors).

On the other hand, what is completely lacking in both study areas is the regional attractiveness, which is largely linked to the poor mobility infra-

structure connecting the coast to the inland. In this sense, one would expect from the projects foreseen in the plan to pay special attention to increasing and implementing mobility infrastructure, but the funding related to Measure 3 - Infrastructures for a sustainable mobility, aimed at supporting actions related to integrated intermodality and sustainable logistics, is completely absent.

In summary, there are inconsistencies at the spatial and political levels:

Areas where most ecosystem services are produced are different from those where they are consumed;

There is still a logic of centralising of resources, with the risk of increasing polarisation processes between the coast and the inland;

Inefficient policy choices due to a lack of resources for mobility infrastructure, which is essential for maintaining the vitality of inland areas;

Spatially unbalanced and excessive funding of actions in areas not related to sustainable development.

Spatial mismatch: reflections and operational proposals

As noted by many authors, the production of ecosystem services is often spatially misaligned with the places where they are most used (Gonzales-Garcia, 2020; Li, Geneletti, Wang, 2023). The main cause of this spatial mismatch is the process of urbanisation, as urban areas produce the fewest ecosystem services and are also the farthest from the places where most ES are produced. A gradient of supply and demand for ES has been identified, starting from urban centres and varying as one moves away from them (Liu et al., 2023).

In the context of these studies, Liguria is in a specific position in that its settlement structure is characterised by a compact linear ribbon close to the coast (interrupted only by a few remnants of less anthropised areas) and a vast hinterland behind it, dominated by the presence of natural and rural environments (with very small agricultural areas) punctuated by numerous but small settlement nuclei.

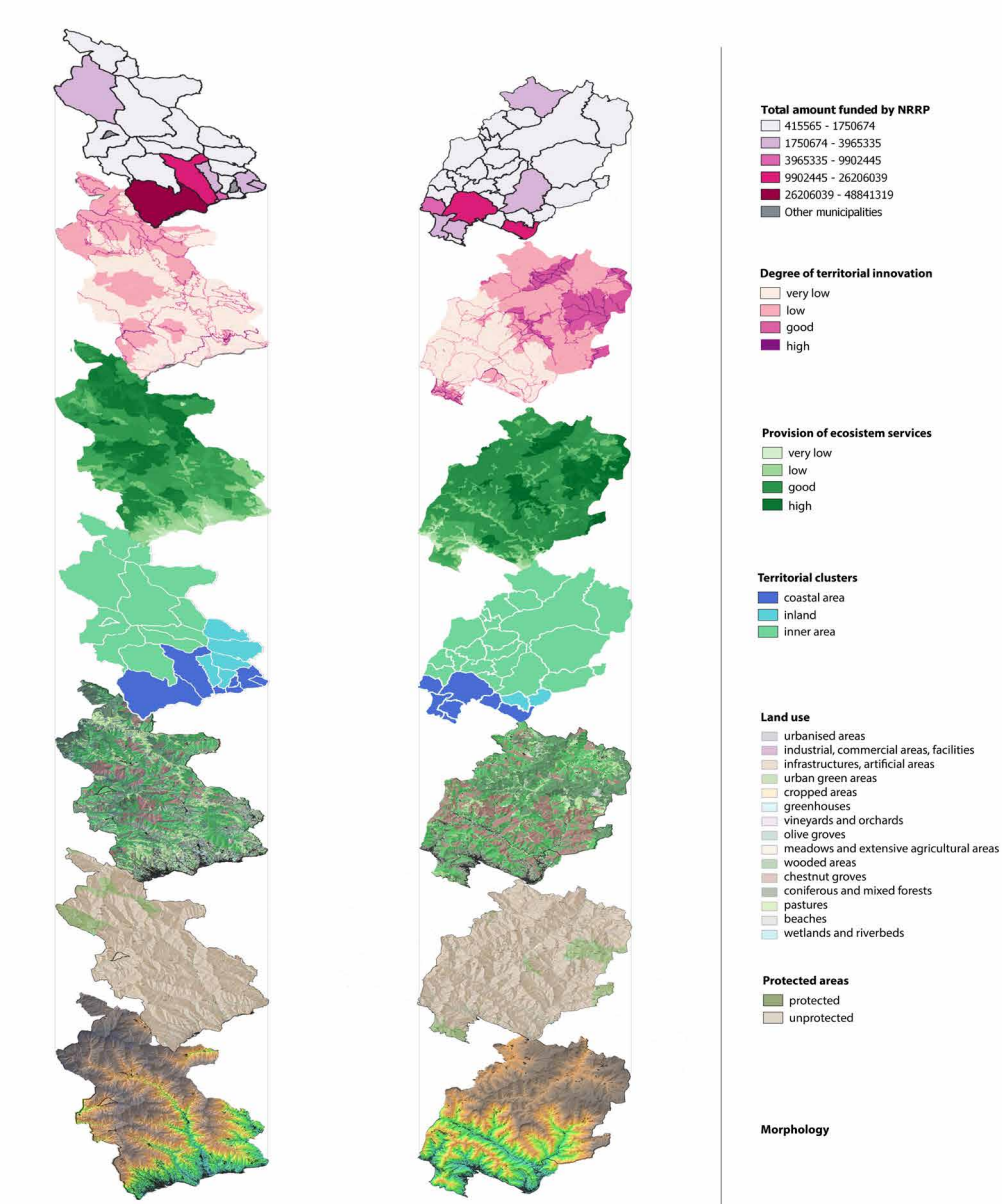
This spatial conformation of urbanisation has led to the de facto eradication of the ancient socio-ecological settlement pattern, which was instead much more oriented perpendicular to the coast, through the use (for settlement and agriculture) of the axes of penetration of the valleys. In addition, the ancient ecological balances between the plain, the slope and the ridge, each characterised by different productions and environments have been lost. Thus, the rich ecological mosaic of the past, in which different crops (olives, vines, vegetables in the plains and coastal slopes, and orchards, arable land and pastures in the highlands) and natural spaces played a decisive role, has been almost completely destroyed by the recent process of urbanisation.

However, in the case of Liguria in general and in the specific case of the two areas consid-

Exploded diagram of the different analysis layers within the two case study areas

Credit: G. Tucci, 2023

Fig. 5



ered here, it must be noted that there are factors that could, to some extent, limit the negative effects of the spatial imbalance that can be observed today, if appropriate integrated spatial planning policies were activated (Barò et al., 2017; Gonzales-Garcia, 2020).

In fact, the morphology of the Ligurian region could be the factor that mitigates the urban-rural gradient: the presence of ridges that are still largely natural (and in any case very little urbanised), and of watercourses that naturally connect the coast and the hinterland through deep valley systems, represent opportunities to create green and blue corridors that could bring SE supply and demand closer together. It would be crucial to establish a spatial planning framework at regional or at least district level to address this issue organically, providing for land use management and control policies (Lyu, Wu, 2023).

Another factor to intervene on is the urban structure of each settlement: indeed, a characteristic of the Ligurian landscape is the historical co-penetration between settlement and nearby agricultural activity. The spatial and functional interpenetration between urbanised areas and green open spaces (agricultural or natural) could be another factor that could mitigate the demand-supply gradient in SE. The high average density of the urban structure of Ligurian settlements (especially along the coast), although a critical ecological factor, is also an opportunity because it guarantees the possibility of leaving green open spaces in close proximity to built-up areas, thus improving the production of SE even in the most urbanised areas.

Finally, it is important to stress that accessibility is another fundamental element of any policy aimed at achieving a spatial and functional rebalancing of the production/use areas of SMEs. In fact, even the good practices of innovation in rural areas highlighted above could only be launched thanks to the functionality of the communications network.

The Ligurian region has serious shortcomings in this respect, mainly due to the complex morphology and the high roughness index of the landscape. The road system is fragmented and more like a tree than a network, which makes the inland areas very inaccessible.

The landscape protection, the location of jobs also in the interior (instead of their concentration only in the coastal conurbation), the promotion of multifunctional agriculture, the support of forms of cultural tourism, all require a good level of accessibility. It is therefore desirable that the improvement of accessibility (which can be achieved mainly by optimising the existing road network rather than by building new road axes) should be achieved by means of regional spatial planning policy based on the greenway concept, which envisages the construction of green and blue infrastructures, including road infrastructure, with a view to the landscaping of road infrastructures.

Conclusion

The two cases analysed represent an important test to define the spatial pattern of the entire Ligurian region in terms of the production of ecosystem services and their spatial distribution. These areas include, within a few kilometres, very different landscapes, from coastal to mountainous. The great diversity expressed by these sub-areas in terms of biodiversity is manifested in a significant and complex spatial pattern of distribution of ecosystem services. What can be observed in these areas is the role played by the different forms of settlement and the rural landscape, which determine a mismatch between the production of ES and the places where they are used.

The paper examines how the policies and actions implemented in recent years have affected these spatial differences and whether or not this mismatch has been reduced. The result of the model was that many of the policies implemented have indeed led to a reduction of this spatial disparity, moving towards a pioneering form of spatial integration of policies. In the absence of an organic planning framework (which does not currently exist in Liguria), a series of fragmented actions can be observed, which however often converge into actions that tend to reduce spatial differentials and promote better landscape protection (and thus guarantee the production of ES over time).

The same actions recently launched in the implementation of the NRPP seem to be moving in the same direction (although it will be necessary to monitor these actions and evaluate their impact in the reporting). Certainly, the fragmentation of policies is not conducive to the establishment of an orderly framework for action, but bottom-up mobilisation (especially on the part of municipalities) seems to compensate to some extent for the absence of a unified and organic overarching spatial planning framework.

The results of the study show how some actions of social innovation in the fields of agriculture and sustainable development (i.e. sustainable tourism) have a positive impact both on the general production of ES and on their more uniform spatial distribution, as they tend to reduce the gaps. In conclusion, it can be said that the activism promoted by local communities (municipalities, but not only) is a relevant factor in promoting innovation in rural areas, which in turn has a positive impact on the production of ES.

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Note

[1] Included in the SNAI Areas 2021-2027 by resolution of the Regional Council 804/2022 and 1187/2022
[2] Ibid.
[3] https://www.governo.it/sites/governo.it/files/PNRR.pdf
[4] The RRF alone guarantees resources of EUR 191.5 billion, to be deployed over the period 2021- 2026, of which EUR 68.9 billion are non-reimbursable subsidies.

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