


# Regenerating the Landscape Through the Co-production of Complex Values

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**Abstract.** Studies and reflections about landscape identify research perspectives that interpret the landscape as a fundamental resource for activating processes of local development. This is an issue of significant importance because the landscape represents the essential resource with which it is possible to compete in the global competition. Landscape can be considered the "attractor" element that gives territories a differential advantage.

The paper explores a field of reflections that help answer some key issues related to improving the quality of decision-making processes to build a more desirable and sustainable future involving stakeholders and local communities and support the co-production of new complex values.

The hybridization processes that have characterized the 'Historic Urban Landscape' represent a prospect of regeneration because the integration between the multiple dimensions, the dialogue with the context, and the synergetic and symbiotic links can promote new forms of vitality and generate tangible and intangible values. Preserving the landscape is no longer sufficient, and an active and regenerative approach is needed. With reference to the landscape of the Cilento, Vallo di Diano and Alburni National Park, the study proposes a development model for landscape regeneration oriented to integrate a trans-disciplinary and holistic approach with operational tools.

**Keywords:** Regenerative landscape · Complex Social Value · Mixed methods

## 1 Introduction

According to the Historic Urban Landscape approach (HUL) [1], the landscape is a complex, dynamic, and adaptive system based on relationships between humans and nature, in which ecological, economic, and cultural dimensions are strongly interrelated. From this perspective, the landscape is seen as a living system in which the existing relationships, synergies and dynamic symbioses between its components should generate new positive linkages to maintain its resilience over time [2].

In the current context, where the landscape is under tremendous pressure, innovative actions are needed to activate regenerative processes capable of maintaining virtuous processes or creating new ones. In this complex situation, the regeneration of collective

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memory and community ties is not enough, but it is necessary to work on recreating connections and meaning between natural, cultural, social, economic, and human aspects.

The HUL approach places heritage conservation within a new systemic vision that links tradition and modernisation, present and past, present, and future in a circular and synergistic perspective. Above all, it considers landscape change in a multidimensional space, emphasising the interdependencies and relationships between the various components and the whole. Therefore, in the HUL approach, conservation is oriented towards respecting the integrity of values and avoiding their alteration but assuming a general perspective of change [3].

The recognition of links, relationships and connections can therefore be interpreted as an indirect lever to promote synergies between different actors/institutions, through a creative integration between conservation and development, from a dynamic and proactive point of view [4]. Thus, the HUL perspective is based on relational principles and aims to integrate different types of values (economic, aesthetic, equity, etc.). The principle of relationality is the conceptual basis of the integrated conservation approach, which values the positive interaction between the different components of a system to determine an increase in the value of all elements. Therefore, an 'integrated' conservation project aims to consciously promote the complementarity of heterogeneous elements/components, seeking the specific conditions that determine a mutual valorisation [4].

In this vision, heritage conservation becomes a "productive activity" capable of generating added value in several ways: improving the quality of life by preserving the spirit of places, stimulating social cohesion, and as a condition for greater economic productivity. Emphasising innovation in conservation (in a dynamic perspective), the HUL approach resists standardisation and focuses on creative conservation for effective development (not only related to tourism).

The management system is, therefore, a key element in the conservation of existing values and the production of 'new' ones. Indeed, its role in the HUL approach is to prevent cultural heritage from remaining merely a testimony to an ancient past. Instead, it aims to generate meanings and sensations (beyond the aesthetic dimension) in the present, stimulating the production of relational values/links and transforming cultural values into civic values and conflicts into synergies.

The transition to the sustainable landscape development model should be based on specific local cultural resources and not only on technological innovations: that is, it should be based on a sound strategy that places the use of cultural resources as a central element of development [5, 6].

The implementation of HUL, therefore, requires not only technical tools but also a strong intellectual and critical process of interpretation and mediation between the different conflicting forces in search of a balance/equilibrium that unites different interests. Therefore, the successful implementation of HUL also depends on strong bottom-up support: a cultural base capable of stimulating cooperative approaches and circular thinking towards the achievement of the general interest.

To explore this new research perspective in a real context, the Cilento Labscape project, promoted by the Department of Architecture, University of Naples Federico II,

has set up a network of laboratories in the National Parks of Cilento, Vallo di Diano and Alburni, in the South of Italy, involving local stakeholders and communities.

The aim was to develop a new interpretive code for the landscape of the Park, based on local innovation, on the ability to organise knowledge of the territory according to systemic logic, on local creative development models that mix formal rules and spontaneous processes. The interaction between tangible components (such as physical infrastructures and services) and intangible components (such as territorial, cultural, and social networks) has made it possible to define the concept of "regenerative landscape" [7] for the National Park of Cilento, Vallo di Diano and Alburni as a complex space in which the issues of competitiveness and sustainability can be addressed, taking into account social cohesion, creativity, adaptive innovation and quality of life.

Based on the experience of the Cilento Labscape project, this paper proposes the integration of transdisciplinary and holistic approaches with operational tools to support the development of landscape regeneration models. More specifically, the second section presents the main lessons learnt from the Cilento Labscape project, the third section presents a development model for landscape regeneration oriented towards the integration of a transdisciplinary and holistic approach with operational tools, and the fourth section discusses the main conclusions.

## 2 A Regenerative Process for the National Park of Cilento, Vallo di Diano and Alburni

The National Park of Cilento, Vallo di Diano and Alburni has a high landscape value. The different forms of capital (tangible and intangible) characterise it and generate a flow of services that can promote the well-being of local communities.

It is an ambivalent territory in which characteristics that are often seen as negative (fragile, marginal, internal, weak, rural, abandoned, etc.) coexist with characteristics that identify significant potential (resistant, central, external, strong, urban, vital, etc.), highlighting contrasts, dialectical and conflictual processes. In particular, there is a constant dialectic between inland and coastal areas, with the latter tending to play a predominant but not dominant role, highlighting cultural and economic conflicts, but also revealing different approaches to the possible valorisation of resources recognised as significant.

The landscape of the Park is configured by processes of different speeds, identifying slow landscapes, whose rhythms are determined by reflective lifestyles, and fast landscapes, influenced by the effects of urbanity, which determine development paths that could be considered complementary and synergistic. Different spatial peripherality levels often coincide with different speeds of development, implemented by different methods that do not always correspond to homogeneous classifiable categories.

The landscape is also configured as a system of values, relationships and interactions between places and communities, declining individual specificities typical of each context, expressions of multidimensional networks of values and resources that require a close look, careful to grasp the main characteristics that they identify the differences and identify places, architectures, histories, stories of everyday life, material culture, life experiences, communities and systems of relationships, tangible and intangible, expression of landscape images sedimented in the cultural memory of each person and

a community. Each of these forms of capital is associated with a particular aspect of the landscape. In other words, this complex landscape is the combination and iteration of six landscapes: natural, manufactured, cultural, economic, social, and human. The specific character of the Park, its identity/attractiveness, is derived from the mutual combination of these landscapes (Fig. 1) [8]:

- The natural landscape consists of existing natural capital (biomass, biodiversity, ecological corridors, agricultural land, natural ecoservices, lakes, rivers, energy resources, etc.).
- The built landscape consists of infrastructures and systems of facilities (roads, ports, pedestrian and cycle paths, aqueducts, sewers, energy networks, technological and ICT networks, housing, public spaces, etc.).
- The cultural landscape is produced throughout history. It is the heritage (cultural memory) of past generations that must be passed onto future generations as a fundamental element of identity (historic centres, squares and historic buildings, spiritual paths and sacred places, etc.).
- The social landscape is represented by social and civil networks, the density of organisations, the third sector, volunteering, and proximity networks that strengthen relationships, ties and social cohesion.
- The human landscape reflects know-how, skills, knowledge of the territory, local entrepreneurship and the creativity of individuals.
- The economic landscape is made up of local credit institutions, foundations, cooperative banks, third-sector organisations, institutions promoting the financing of neighbourhood projects, and micro-credits.

Following these points, the quality of the complex landscape, and the expression of all its values, has been recognized as the key element of a territorial innovation process that should guide the transformations of the Park, i.e. the entry point for new development dynamics of the territory. In fact, an adaptive and synergistic strategy should not only invest in maintenance, recovery and urban and environmental regeneration, but should also be able to link the various "territorial laboratories" and innovative projects carried out by local communities in the Park, in order to create new symbioses and thus become a source of attraction.

Based on the high potential of the ecological, natural, and cultural resources that characterise the Park, the quality of the space and the functional integration of housing, work, leisure, mobility, social and cultural services, agriculture and natural resources should be improved in order to attract new investments to the area that generate various added values, combining beauty, creativity, knowledge, social environment and economy [9, 10].

In this way, an "economy of places" should be promoted and integrated with the "economy of flows" that currently attracts tourists to the Park for the beauty of its landscape. The integration of both forms of the economy could become a fundamental "strength factor" of the territory, a catalyst for more sustainable economic development [11].

Therefore, a place-based innovation strategy is particularly relevant to enhance the value of places, their identity and diversity, and to give meaning and a role to different

landscapes, stimulating economic growth and endogenous development. The local laboratory system thus becomes an opportunity to build innovative and creative forms of the economy [12], which contribute to enhancing the value of places, regenerating the value chain and at the same time promoting new interactions in ever-new combinations.

The local actors agreed that the National Park of Cilento, Vallo di Diano and Alburni would have to invest in human and social capital to build a more desirable future. In fact, the circular processes that contribute to the creation of resilience and the development of places have a good chance of being implemented only if there is a strong social and human capital.

Indeed, the quality of the landscape, understood as the quality of the places, the infrastructure system, the human and social capital of a territory [13] and the institutions themselves, contributes to increasing or decreasing the productivity level of a territory. For example, a territory's experience and professionalism give it a competitive advantage over other territories, creating an attractive capacity that translates into productivity and wealth.

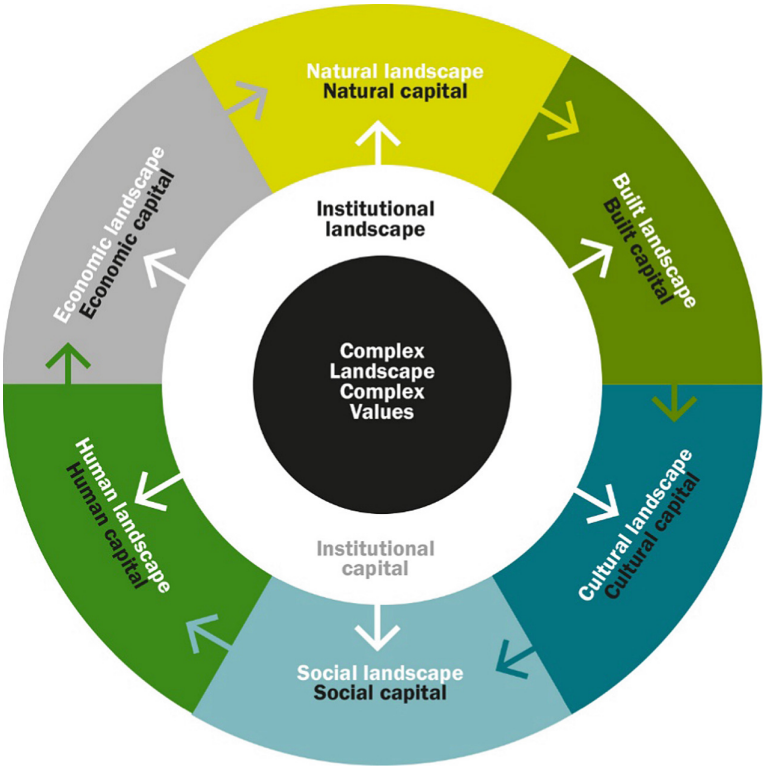


**Fig. 1.** The six forms of capital and their corresponding landscapes: a synergistic model (Source: adapted from Fusco Girard, 2013)

Therefore, a quality landscape is the result of cultural processes that evolve over time, creating new relationships and knowledge. In turn, the landscape modifies the

territory's knowledge, ideas, and values and, thus, its culture. Talking about knowledge and culture means talking about ideas and values, ways of life, but also about people: their creative and interpretive intelligence, their collective and cooperative capacities, their willingness to forge new common bonds to develop "guiding ideas".

The people who make up the community as a whole have real knowledge, which is different from academic knowledge because it is closely linked to context and everyday life. This knowledge generates the capacity to adapt, experiment, learn and evaluate. High quality human and social capital feeds these virtuous circles.

In the era of globalisation, each territory must identify its own specificities, which make it different and unique, and try to exploit the existence of these differences to be more attractive by virtue of the production factors it possesses and from which its strategic scale can derive locally and globally.

Productivity is closely linked to the ability to activate circular processes. The basis for research into productivity growth and circular processes is research into the use (or re-use) of the knowledge produced in each territory.

Culture is the key factor for local development, and it is, therefore, necessary to invest in strengthening the territorial cultural base as a prerequisite for greater productivity [14]. Culture is the real driver of change and can guide the transformation of the territory towards a polycentric, cooperative organisation, in which critical knowledge allows the choice of the most appropriate priorities for the context, in order to accelerate change and contribute to the construction of a general interest for the territory, making people the builders of the territory and the landscape.

The transition to a human and sustainable landscape requires the participation of institutions and citizens. A bottom-up approach can help to identify a "public space" for dialogue, through which it is possible to build specific responses to the major challenges of our time.

One of the main lessons learnt by the Community of the National Park of Cilento, Vallo di Diano and Alburni is that the identification of a cultural project for the territory and for the landscape is essential for its strategic development, tending towards the "cultural regeneration" of the landscape, open to "shared knowledge" and therefore able to educate to the critical comparison of different values, visions, impacts, in an interactive process open to the different forms of the rationality of the various social actors.

## 3 Towards Regenerative Landscape Models

The relationship between humans and nature has gradually deteriorated over time. Extracting everything we need from nature has created an unprecedented ecological deficit, and the importance of restoring this fundamental bond is being recognised.

Recent research perspectives focus on the need to rethink how we produce and satisfy our needs, recommending restructuring production processes in a circular modality by analogy with nature. This perspective also introduces a new vision of sustainability, which aims not only at preserving the various forms of existing capital, but also at circularising processes in a more resilient perspective [15]. Resilience is a necessary condition for sustainability because it is related to the ability of a system to adapt while maintaining its own identity under the pressure of external conditions. Synergies and

circularity lead to symbiosis, i.e., an exchange between elements (e.g., the product of one becomes the food of the other) to create stable bonds.

The concept of symbiosis can be compared to that of hybridisation, since both are based on the existence of a dialectical duality (i.e., the existence of pairs of opposites, sometimes in conflict). In reality, hybridisation is not the connection or fusion of heterogeneous (or even incompatible) elements, but rather the deliberate combination of these different entities.

The concept of hybridisation has been borrowed from genetics, where it recalls crossing and grafting, to refer to architectural and urban phenomena, seen as the expression of a living organism characterised by dynamism, complexity, and the capacity for evolution.

Today, the adjective 'hybrid' is used to indicate the intersection between the various components of architecture, urbanism, economics, sociology, but also in the more general field of culture and politics. In fact, the term emphasises the discrepant and contradictory nature of elements that are sometimes deliberately combined, even referring to incompatible logics. The result can therefore be negative, leading to a lack of homogeneity and no concrete results, or positive, because it can generate added value. In this sense, it goes beyond traditional concepts and introduces the need to look at the relationships that have created value over time.

In urban planning, the "hybrid landscape" (urban/rural) concept has been introduced to highlight the coexistence of different organisational structures, natural or artificial, in certain contexts, especially in peripheral areas. The hybrid landscape is characterised by the coexistence of multiple identities.

In architecture, Joseph Fenton has pointed out that hybrid projects express efforts at urban regeneration and the search for greater efficiency in the use of land resources [16].

In economics, hybridisation processes refer to the absence of a clear separation between production and organisational logic. They consist of deliberately bringing together different aspects, characterised by specific organisational architectures, to add value and improve competitiveness. An example is the relationship between profit sectors (companies competing on the market) and non-profit sectors (social enterprises, cooperatives, etc.), which generates a new mutualism and forms of co-production and cooperation, sharing both means and ends. An important example of hybridisation can be found in the service sector, particularly effective in the Living Lab [17–19], where innovative evaluation approaches allow solutions to be defined in a collaborative way, enabling the transition from the experimental phase to the proposal.

In the field of evaluation, the Planning Balance Sheet and the Community Impact Evaluation proposed by Nathaniel Lichfield are tools that express the concept of hybridisation in that they structurally combine the logic of welfare economics (cost-benefit analysis, cost-outcome analysis) with the logic of other approaches (decision theory, governance, etc.) based on the ability to pursue specific objectives.

Multi-criteria, quantitative-qualitative and multi-group evaluation methods are further examples of the implementation of hybridisation in evaluation processes [20].

In the field of culture, hybridisation is structurally related to transdisciplinarity. Transdisciplinary knowledge, as opposed to monodisciplinary, interdisciplinary, multidisciplinary, etc., is based on general systems theory and complexity theory. It has promoted ecological economics, bio-economics, socio-biology, biophysics, art, technology, etc., overcoming the fragmentation of sectoral knowledge and improving mutual relations [21]. Based on the principle of relationality and characterised by a pluralist approach that expands and enhances the current disciplinary perspectives of specialised information, the aim of transdisciplinary knowledge is to "go beyond", i.e., to transcend disciplinary approaches, to identify new approaches, new models, and perhaps even new paradigms.

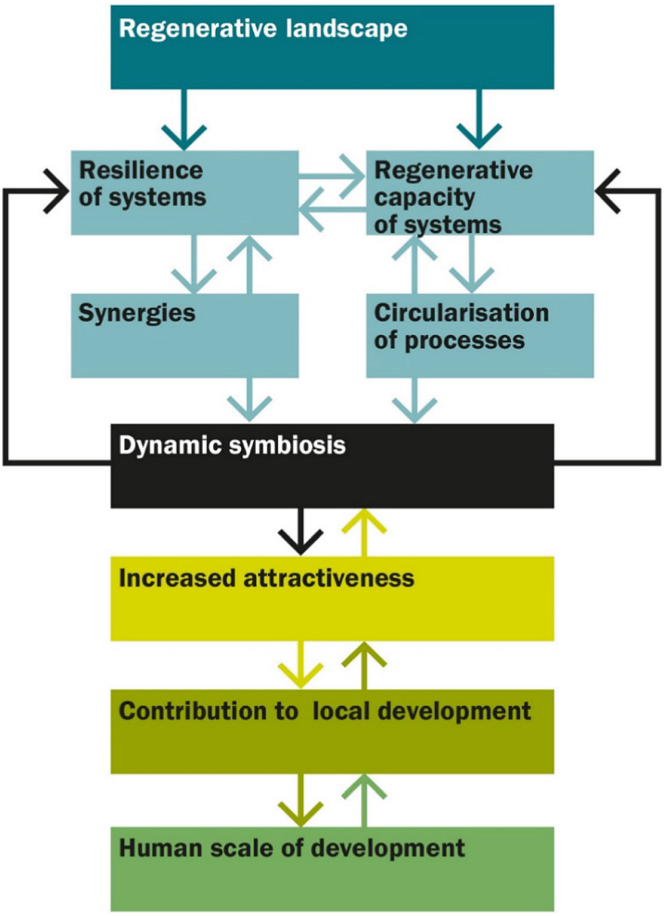


**Fig. 2.** A model for the development of a regenerative landscape

Transdisciplinary research is characterised by a high degree of integration, not only in terms of research between technical and professional disciplines, but also between problem-solving and learning skills, between academic and non-academic knowledge,

and between theoretical and operational knowledge. From this approach, landscape is a good example of a research area that requires a structurally transdisciplinary approach.

In this perspective, we propose the landscape regeneration development model shown in Fig. 2. It describes synergies' key role and processes' circular organisation in improving landscape resilience. In fact, the links and relationships between the different forms of capital generate development activities. More specifically, the density of these links and relationships generates capacities, values, work and employment, and thus new opportunities for human development. The model, therefore, uses synergies, circularity and symbiosis as tools for multiplication. Extended to the urban and social context, the circularity of processes can be transferred from industry to the organisation of the city and territory itself, to the economy, to the social system and to governance [8, 22].

As defined by Chertow [23], industrial symbiosis is an activity that involves normally separate industries in a collective approach to competitive advantage, including the physical exchange of materials, energy, water and/or by-products. The key to industrial symbiosis is cooperation and the synergy opportunities offered by geographical proximity. Industrial symbiosis is part of the broader field of industrial ecology (from which it is a direct application) [24], which, by optimising material cycles, has implications for planning, environmental management, and economic development.

An extension of industrial symbiosis is urban symbiosis, an activity that transforms solid waste into inputs for the industry. It was introduced by van Berkel et al. [25] to describe recycling activities that find their reason to be in the geographical proximity and synergistic relationship between solid waste producers and industries.

The concept of urban symbiosis is closely linked to "the use of by-products (waste) from cities (or urban areas) as alternative raw materials or energy sources in industrial operations", resulting in the reduction of pollutant emissions and the recovery of raw materials. New symbiotic opportunities are created by creating a link between solid waste and local industry.

This cyclicity is reminiscent of natural ecosystem processes. Another symbiosis is that between urban and suburban areas [26]. The benefits of synergetic, symbiotic, and circular processes are expressed not only in lower environmental costs, but also in the generation of greater economic benefits and new jobs. They, therefore, contribute to determining the specific attractiveness of an area compared to others. In essence, these processes shape the urban and suburban landscape: they make it more or less attractive for the location of new activities, new investments, and specialised manpower.

Based on the territorial relations system, this local economy model is more resistant to the globalized economy's shocks and offers greater opportunities for self-government and self-sustainability. It identifies the different circuits of value creation (cultural, economic, and civil), which are put in synergy with each other based on the principle of relationality between economic productivity, manufactured and infrastructural capital, cultural heritage, social capital, environmental/natural capital, and human capital/creativity.

## 4 Conclusions

Cities and territories are increasingly investing in the knowledge economy, redirecting financial resources to stimulate investment in the production of knowledge. Culture is not only ideas, but also values, and ways of life that shape the landscape. The production of knowledge can help decision-makers balance objectives of economic efficiency with objectives of social cohesion and environmental sustainability.

The real challenge for the future is the ability to promote a new "science for the city and for the landscape" with a more forward-looking approach: the ability to build an integrated transdisciplinary, holistic and, at the same time, more operational approach, based not only on academic but also on technical-professional expertise, towards a post-disciplinary perspective.

Possible perspectives for new research on landscape and territory to promote the transition to a new circular economy should concern some important themes: the role of intangible capital for the production of wealth in cities and territories; the construction of symbiotic, metabolic and hybrid processes; the identification of new management models to improve living conditions; the implementation of good practices using specific evaluation tools; the multidimensional evaluation of territorial impacts; finance and sustainable development; entrepreneurship and eco-innovation; entrepreneurship and the social economy [27].

The key element in all of the above themes is the recognition of the role of culture in making the landscape more desirable for the future, where circular economy processes can contribute to a series of benefits in terms of reducing costs and waste, creating new jobs, reducing environmental impact and activating transition processes towards a new development model based on the interpretation of land and landscape as a living organism, regenerating co-evolutionary and cultural relationships.

As demonstrated by the territorial laboratories activated in the Cilento Labscape project, the interaction between skills and knowledge provides complementary views and interpretative approaches capable of activating new synergies. In fact, each laboratory, although focused on different themes, has made it possible to interpret the territory and to identify with the local communities the opportunities for networking values, interests and resources. Through the different interpretations of the landscapes of the National Park of Cilento, Vallo di Diano and Alburni, it was, therefore, possible to imagine a new geography of the Park with the local actors, pioneers of territorial innovation processes.

A common element of each laboratory was the concept of the "regenerative landscape", according to which the landscape, as a collective resource, requires an organisational structure that encourages the choice of individual cooperative strategies that consider the impact of one's own actions and decisions on the environment and on the other beneficiaries of the landscape.

In this context, it is important to recognise that, through a dynamic participatory process, the local communities are able to give themselves organisational structures that are attentive to dynamic change and adaptable to the transformations suggested by the emergence of new knowledge.

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## References

1. UNESCO: Recommendation on the Historic Urban Landscape. UNESCO World Heritage Centre, Paris, France (2011)
2. Plieninger, T., Bieling, C.: Resilience and the Cultural Landscape. Cambridge University Press, Cambridge, MA (2012)
3. Bandarin, F., van Oers, R.: The Historic Urban Landscape: Managing Heritage in an Urban Century. Wiley, New York (2012)
4. Fusco Girard, L.: Toward a smart sustainable development of port cities/areas: the role of the 'historic urban landscape' approach. Sustainability **5**(10), 4329–4348 (2013)
5. Mercier, C.: Cultural planning for urban development and creative cities (2006). www.burgosciudad21.org
6. Fusco Girard, F.: Innovative sustainable companies management: the wide symbiosis strategy. In: Ghenai, C. (ed.) Sustainable Development, Policy and Urban Development Tourism, Life Science, Management and Environment, pp. 367–386. InTech, Rijeka (2012)
7. Gibbons, L.V., Cloutier, S.A., Coseo, P.J., Barakat, A.: Regenerative development as an integrative paradigm and methodology for landscape sustainability. Sustainability **10**(6), 1910 (2018)
8. Fusco Girard, L.: Creative cities: the challenge of "humanization" in the city development. BDC **13**(1), 9–33 (2013)
9. Daniel, T.C.: Whither scenic beauty? Visual landscape quality assessment in the 21st century. Landsc. Urban Plan. **56**(1), 276–281 (2001)
10. Franke, S., Verhagen, E. (eds.): Creativity and the City. How the Creative Economy is Changing the City. NAi Publishers, Rotterdam (2005)
11. Greffe, X.: Culture and Local Development. OECD, Paris (2005)
12. Florida, R.: The Flight of the Creative Class. Harper Business, Harper Collins, New York (2005)
13. Cerreta, M., La Rocca, L.: Urban regeneration processes and social impact: a literature review to explore the role of evaluation. In: Gervasi, O., et al. (eds.) ICCSA 2021. LNCS, vol. 12954, pp. 167–182. Springer, Cham (2021). https://doi.org/10.1007/978-3-030-86979-3_13
14. Cerreta, M., Daldanise, G., Sposito, S.: Culture-led regeneration for urban spaces: monitoring complex values networks in action. Urbani izziv **29**, 9–28 (2018)
15. Mazzarella, C., Amenta, L.: The circular metabolic urban landscape. In: Regenerative Territories: Dimensions of Circularity for Healthy Metabolisms, pp. 71–88 (2022)
16. Fenton, J.: Hybrid Buildings. Pamphlet Architecture, no. 11. Princeton Architectural Press, New York (1985)
17. Marsh, J.: Living labs and territorial innovation. In: Cunningham, P., Cunningham, M. (eds.) Collaboration and the Knowledge Economy: Issues, Applications, Case Studies. IOS Press (2008)

18. European Commission (EC): Living Labs for user-driven open innovation. An overview of the living labs methodology, activities and achievements. Directorate-General for the Information Society and Media, Unit F4 New Infrastructure Paradigms and Experimental Facilities, Luxembourg (2009). https://doi.org/10.2759/34481
19. Leminen, S., Nyström, A.-G., Westerlund, M.: Change processes in open innovation networks - exploring living labs. Ind. Mark. Manag. **91**, 701–718 (2020)
20. Cerreta, M., Poli, G.: Landscape services assessment: a hybrid multi-criteria spatial decision support system (MC-SDSS). Sustainability. **9**(8), 1311 (2017)
21. Zeleny, M.: Knowledge and Self-Production Processes in Social Systems. UNESCO Encyclopedia (2001)
22. Etzkowitz, H.: The Triple Helix: University-Industry-Government Innovation in Action. Routledge, London (2008)
23. Chertow, M.R.: Industrial symbiosis: literature and taxonomy. Ann. Rev. Energy Environ. **25**, 313–337 (2000)
24. Ayres, R., Ayres, L.: A Handbook of Industrial Ecology. Edward Elgar, Cheltenham (2002)
25. van Berkel, R., Fujita, T., Hashimoto, S., Geng, Y.: Industrial and urban symbiosis in Japan: analysis of the eco-town. J. Environ. Manag. **90**(3), 1544–1556 (2009)
26. Fujita, T., Ohnishi, S., Liang, D., Fujii, M.: Eco-industrial development as a circularization policy framework toward sustainable industrial cities. Lesson and suggestions from the eco town program in Japan. BDC **13**(1), 35–54 (2013)
27. Chesbrough, H.: Open Innovation. The New Imperative for Creating and Profiting from Technologies. Harward Business School Press, Cambridge (2003)