Taxonomies. Architectures, scales and themes for a peri-urban sustainable regeneration

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This contribution analyzes issues and spaces of the architecture for the regeneration of peri-urban areas according to the perspective of the programs to combat the effects of climate change activated by the Green Deal and New European Bauhaus. The contribution aims to highlight how the Taxonomy elaborated by the EU needs a multilayer integration coordinated by a systematization of environmental resources with cultural ones and with the project of territories, as well as how research in architecture can interact and act as a catalyst concerning the objectives set by the European Union. Places of experimentation for a possible taxonomy can be peri-urban areas as catalysts of integrated regeneration processes.
Keywords: taxonomy; climate change; architecture

Tassonomie. Architetture, scale e temi per una rigenerazione periurbana sostenibile
Il presente contributo analizza temi e spazi dell'architettura per la rigenerazione delle aree periurbane in direzione dei programmi di contrasto agli effetti del cambiamento climatico attivati dal Green Deal e New European Bauhaus. Si vuole evidenziare come la Tassonomia elaborata dalla UE necessiti di una integrazione multilayer coordinata da un progetto di sistematizzazione delle risorse ambientali con quelle culturali e con il progetto dei territori, e di come la ricerca in architettura possa interagire e fungere da catalizzatore rispetto agli obiettivi prefissati dall'Unione Europea. Luoghi di sperimentazione di una possibile tassonomia possono essere le aree periurbane quali catalizzatori di processi di rigenerazione integrata.
Parole chiave: tassonomia; cambiamenti climatici; architettura

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Perimeter as an oxymoron

There is a place where the themes and objectives of *The New European Bauhaus policy ecosystem*[1] are condensed.
This place is represented by the peri-urban *fringes*, whose definition is often declined with adjectives that fail to include the meanings and values that these can assume. The indeterminacy of these spaces makes their classification complex concerning the tools of the architectural project at different scales. The urban fringes are «defined by different entities: architecture, natural elements, artefacts of landscape and history, preestablished alignments and tracks» (Spinelli, 2021: 53).[2] This interpretation must be accompanied by cataloging all the elements that the apparently empty peri-urban areas contain or establish confusing mutual relationships as agricultural areas, disused industrial areas, infrastructural layouts, eroded and incomplete urban grids, and variable and hybrid typologies. In these terms, as expressed by Mortoja, Yigitcanlar, and Mayere (2020), a key point concerns how to determine valid criteria to define the peri-urban features in terms of space, culture, and society. These take the character of dynamic places where the urban texture changes shape and size, replaced by figures, which constitute a network that can establish different meanings that need to be compared with different scales (Dadashpoor, Ahani, 2021). Somehow it is possible to introduce aspects of their regeneration that refer to disciplines and tools that are also very different from each other.
The heterogeneity makes it necessary to define the physical perimeters of intervention, which bring together a multidisciplinarity of skills. Each with its tools and methodologies so that «a diverse spectrum of interstitial spaces that lie between developments that make cities physically discontinuous, spatially porous, and environmentally diverse.» (Silva, 2021: 108).
Thus, environmental diversity becomes the main element to address in achieving the objectives of the European Green Deal and the New European Bauhaus through regeneration projects. These two initiatives include a broad spectrum of actions to cover goals envisaged within the Ecosystem of European policies and that of specializations and the aspects that these contemplate.
Nonetheless, their physical perimeter does not find a univocal correspondence but always needs to be negotiated with the different instances that interest them. This indeterminacy of limits contributes to determining variable geography (Silva, 2021: 108), within which measuring the ecological footprint is necessary to activate actions capable of regenerating them, profoundly

affecting the measure of actions about the scale and objectives. Moreover, their extension, strictly related to the evolution of urban systems, is also amplified thanks to the «extraordinarily large ecological footprints, and collectively they create significant environmental impact» (Azhar, Gjerde, 2016: 1).[3]

From this perspective, it becomes necessary to reverse the paradigm that wants these 'empty' areas not used (Azhar, Morten, 2016). For instance, reframing the concept of 'use' is necessary, which cannot be related only to the conventional act of dwelling. These areas could be reconsidered to become amplifiers of an ecological potential but also places to promote other vocations in the direction identified by Aalto: «Aalto spoke of seeking to avoid the creation of 'psychological slums' through the sensitive adaption of settlements to the 'surroundings and terrain'» (Menin, Samuel, 2003: 2).

This could be done by coordinating the development of networks and systems through actions that act on different levels: fiscal, cultural, environmental, and social to «promote and incentivize the restoration and expansion of healthy global ecosystems, foster creative participation by citizens and, by extension, reapportion resources and economic power at local, regional, and global scales» and at the same time help reduce the co^2 emissions (Azhar, Gjerde, 2016).

In this condition, the actions and programs undertaken by the EU with the New European Bauhaus have outlined interventions and research scenarios in which interaction and multidisciplinarity are necessary to contribute to the sustainability of intervention programs and actions.

From EU taxonomy to project taxonomies

EU Regulation no. 2020/852 introduces the EU Taxonomy as a «tool to help investors, companies, promoters, and project financiers» (EU TEG, 2020: 2) to move towards an economic transition in which ecology and the reduction of consumption of fossil fuels is the primary goal.

By setting performance thresholds, the Taxonomy directs economic choices and actions toward the six environmental objectives,[4] including mitigation and adaptation to climate change. The transition towards circular economy principles, the protection and restoration of biodiversity and ecosystems[5] is framed in a perspective in which each action must not cause significant damage (DNSH) to the others. This principle is fundamental because it requires broad integration and involvement of productive and transformative processes, including the relevance of urban and peri-urban regeneration at different scales.

In setting the performance thresholds, the taxonomy will profoundly impact economic processes because it introduces criteria for measuring the effects of financial investments in terms of environmental, social, and cultural sustainability. Moreover, the regulation of the EU-TR Taxonomy opens a precise legal path in which companies, actors, and lenders must adapt to a series of protocols that consider them «Taxonomy-aligned» (EU TEG, 2020: 2) to be recognized as 'sustainable' operators.

Although the actions of the EU taxonomy essentially embrace the economic aspect of the fight against climate change, these actions have an operational impact on the production and transformative processes of materials, products, and spaces for a real commitment to sustainable and coordinated transformation in the direction of reducing the effects of climate change (EU TEG, 2020). Furthermore, all economic sectors are called to contribute to achieving the identified objectives in this context. The tools also fully embrace the urban transformations and the regenerative processes of cities and buildings.

As already anticipated in the European Green Deal, among the financial and industrial reforms, interventions on the existing building stock are an essential part of the policies to reduce emissions and consumption of resources. Together with the urban fabric, networks, and spaces, buildings represent an integral portion of an ecosystem whose resistance is increasingly tested in this era of climate change. Intervening on buildings without considering the space between each other becomes a 'climatically uneconomic' operation. To truly constitute an integral and circular cycle, the urban (but above all peri-urban) space needs to be considered an essential part of the economic sustainability balance of the regeneration interventions. Therefore, if the EU Objective is directed towards a taxonomy that encompasses the aspects of environmental regeneration with the social ones (EU TEG, 2020: 51), it is evident that the space in which society lives becomes an active subject to be included in the EU Taxonomy. Only through design and a coherent urban strategy is it possible to combine the different NACE Activities (Nomenclature of Economic Activities) framed by the Summary tables of the Taxonomy (EU TEG, 2020: 56-63) in a truly effective and integrated way. The economic and organizational dynamics determine dwelling conditions by keeping buildings with infrastructures, water systems, and natural and agricultural spaces together.

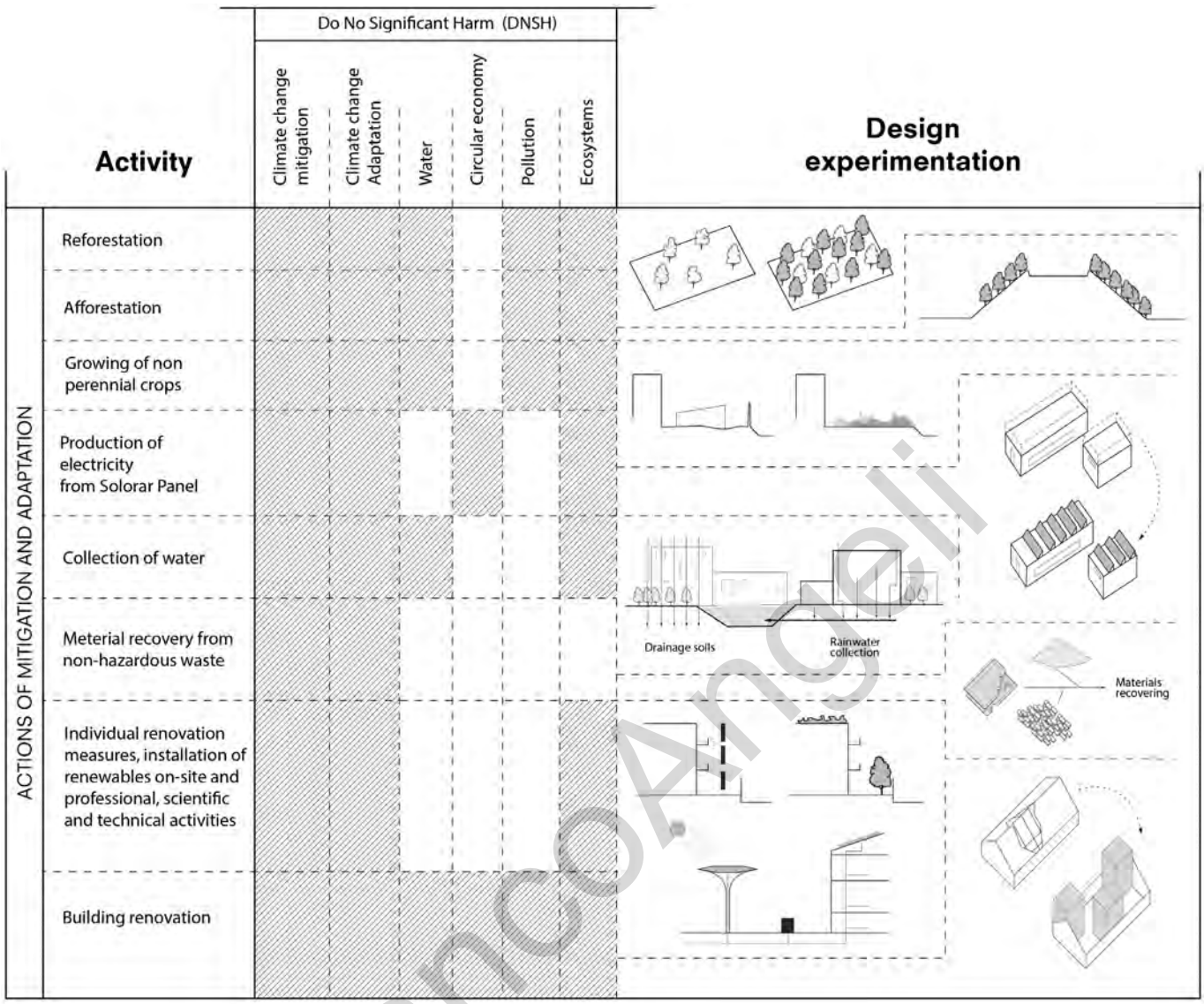
In this context, the Ecosystem of the New European Bauhaus policies becomes a catalyst of processes, potentially triggering an interaction of actors, figures, and spatial, social, cultural, and economic programs.

Urban fringes and resource spaces

In this framework, fringes represent 'resource spaces' for urban systems where investment often sets transformation processes. Sustainability in the fringes frequently has to deal with the lack of adequate operational tools capable of combining environmental, spatial, architectural, infrastructural, social and economic dimensions.

Additionally, urban transformations can determine the division into episodes (Bonfantini, 2021: 25) and identify plots and figures within which to correctly catalog and understand the limits (Azhar, Gjerde, 2016: 282). Moreover, the difficulty of cataloging and outlining makes it hard to define the value of the elements that constitute them, of what is included or excluded from processes and actions. One of the most compelling aspects is covered by the economic value of these places. Referring to these areas, we could affirm that market values contemplated by real estate companies do not show the real potentiality they have (Lopez-Pineiro, 2021: 10). Indeed, urban fringes should be looked at from their environmental, social, and cultural potential also framed as «non-economic opportunities» (Lopez-Pineiro, 2021: 10). These values are those to which the New European Bauhaus aims and must interact with the EU Taxonomy.

These are often places without spatial quality, in which the legacy of the modern has not imagined adequate forms or figures of the project. The modern urban grid does not allow for



1. The image represents the activities proposed by the European Taxonomy, related to design experimentations that could portray a possible project for spatial actions in a European perspective. The relation between the two elements reveals the possibility of spatializing the European policies for a renewed design culture. Author: Emilia Corradi.

deformations, gaps, or an irregular edge; however, Le Corbusier, in Chandigarh, systematizes urban voids in green corridors. They interrupt the grid and introduce intervals of programed nature to enhance the role of natural elements in the climate management of the city. This attitude to pause, however, has not been reflected in the modern processes of urban evolution; indices, fillings, and traces drove that, but rarely through the project. An absence that, in fact, has resulted in a collection of fragments, fringes without any relationship with other project categories, and in which irregularity becomes an absence of any kind of value. Nevertheless, the lack of direct economic value can be the opportunity to redeem these places, which can be 'intertwined' with the city through their imperfect edges. Made permeable and reintegrated into the urban metabolism (Busquets, Yan, Keller, 2020: 630-667), they participate in cities' environmental, cultural, and social values.

In this meaning, «the frontiers between divisions and dichotomous taxonomies»[6] (Gausa, 2022: 15) not only are confused but suggest a new permeability of actions, definable as 'hybridizers', which in the last thirty years have increasingly absorbed the performative character (Gausa, 2022: 15). On the performative character of architecture, the contribution by Manuel Gausa in «Topologie verdi e paesaggi oltre il paesaggio» traces an interesting relationship between digital technologies and their translation in design actions aimed at the spatial efficiency «(eco-optimized and techno-mediated) between habitats and environments»[7] (Gausa,

2022: 19). This relation rereads the design and landscape experimentations of the last 30 years, focusing specifically on the role of ground and on the progressive importance of digital technologies for the analysis, data collection, and spatial modeling at the different scales.[8] The eco-systemic dimension becomes essential in rethinking these spaces beyond the aesthetic value. Assuming them as catalyzing elements of new ecosystems capable of holding together different instances in a condition of ecological balance by triggering «a positive interaction»[9] (Gausa, 2022: 15). These are possible through the introduction of new «operative topographies»[10] (Gausa, 2022: 16), able to affect new architectural and topographical spatialities in which architecture is not aestheticization but above all a conscious response to social, environmental, cultural, and economic demands.

The fringes become an opportunity to give back an open spatial system to the city, in which spatial deformations can be an opportunity for design experimentation in which the environment, community, culture, and economy offer a real chance of a 'vital'[11] circularity. Operating within the undefined edges of the city means, on the one hand, rethinking the relationships between the city and the rural system of the territories and, on the other hand, opening up the possibility of equipping the city with ecological and natural structures that are able to increase urban resilience. It is a problem of scale, interpretative codes, typo-morphological, and environmental analyses. Keeping long lines of natural infrastructures such as rivers and streams together with those of road infrastructures requires a considerable analytical and interpretative effort. At the same time, it is considered necessary to analyze them in relation to the settlement fabric, which in these areas has an inconsistent structure made up of buildings of very different nature, scale, and times. In this sense, the soil project[12] and the architectural design can help to build the necessary urban and territorial relations and, at the same time, be accredited as a taxonomic factor and tool (fig. 1) for preventing the effects of climate change in the direction of cultural elevation expressed by the New European Bauhaus.

A taxonomy of the peri-urban project

An experiment on how to identify project tools that meet the objectives set by the eu Taxonomy is represented by the results of a phd international workshop on *Fringes' renewal. Enhancing urban and peri-urban fragile areas*. The workshop asked the phd candidates of the 36th cycle a series of questions concerning the role and tools of the architectural and landscape project based on the usage of Nature-Based Solutions and usage of resources.

Looking at the EU Taxonomy, the actions come from the 'Mitigation and Adaptation' sphere and are specifically referred to those related to the built environment renovation. More specifically, the doctoral projects investigate how to implement Nature-Based Solutions such as 'Reforestation, Afforestation, and Growing of non-perennial crops'. To increase energy production from renewable resources through the 'Production of electricity from Solar Panel, installation of renewables on-site, professional, scientific and technical activities'; and to foster a circular transition of the project, thus implementing solutions for the 'Collection of water, and the material recovery from non-hazardous waste'. All these general activities, promoted and proposed by the EU Taxonomy, are then translated into spatial strategies of modification and regeneration, displaying a clear design perspective of the European policy.

Moreover, applying these solutions opened the possibility of investigating the qualitative effects of the new policies in urban and peri-urban transformations to respond to the climate crisis. Thus, the goal was to build a 'methodological taxonomy' that, through design-driven experimentation, would identify design techniques, innovative design elements, experimental spatial organizations and investigation on the inhabitants' perception of renewed spaces.[13]

The outcomes are represented by four methodological projects, which have as their starting point the construction of the cognitive and descriptive framework necessary to identify themes, places, and actors to the problems, as well as the strategies needed to start the transformation processes. The descriptive framework consists of both traditional urban analyses and social, environmental, and climate analyses using tools very different from others in terms of approach, technology, scale, and disciplines involved.

The reading phase highlighted the need to understand the fragilities of marginal areas. These are understood in the first instance from a physical/spatial perspective, identifying the critical issues through morpho-typological analyses to relate a critical knowledge of the fabrics and the territory, highlighting the characteristics and the implicit possibilities of transformation. On the other hand, physical fragilities are amplified by as many climatic criticalities, which therefore require an analysis of quantitative data, which must be read with the spatial characteristics of the territory.

The approach proposed by the lecturer was aimed at framing themes, analyses, and projects within a strategy that sought to highlight the close relationship with the perspectives posed by the New European Bauhaus.

Furthermore, the climate analysis theme was central as a basic assumption for identifying points of connection with the EU Taxonomy, as climate analysis is considered an essential step in characterizing a conscious and effective design response.

The method proposed by the Ph.D. candidates synthesizes qualitative and quantitative analyses. It assumes the need to evaluate climatic data, which support and demonstrate the presence of climatic criticalities, and links these fragilities to physical issues. Therefore, observing the city's morphological issues is crucial in building a design response related to urban fabrics, especially the more complex ones of the urban fringes. The project proposal *Engage with the limit. The open space as a design element to enhance and reconnect fringes* by the group composed by Carla Bulone, Kevin Santus, and Hu Dan, which uses morphological analysis as an approach to the project, is placed within this horizon, through which to identify the urban measures with which to confront and build a project perspective between empty space and the built environment. The morphological observation of the territory reveals a project structure capable of tracing the area's founding elements and the unexpressed potential. Here, the need for a gaze that returns to observe the shape and physicality of the territories is demonstrated. Above all, in the face of growing climatic fragility. The project is observed as an approach between scales, as the process of recognizing fabrics and their settlement value between built fabric and open spaces.

Rethinking the public equipment and operating on the connection systems reveal the potentialities of using nature as a design tool to work between the fragments. In this way, the project allows for recomposing a connective fabric within peri-urban areas.

This theme is visible in the four projects, with different perspectives, highlighting the issue of the 'perimeter' of the project's application field.
The proposals consistently work on the limits between the areas, underlining the possibility, through adaptation processes, of rethinking urban thresholds and margins in their physical and social re-imagination. The complexity of these territories, which finds in the infrastructures a prominent character in defining the boundaries and 'perimeter' of the individual areas, also reveals the need to rethink them in the spatial conditions they generate. Observing the four projects as methodological and meta-design investigation processes is appropriate in this sense. They must be considered as experiments that have not resulted in a finished project; instead, they are design reflections that open up to potential considerations on the meaning of adaptation projects in the practical-theoretical field.
A critical observation of the methodologies and tools applied opens to further considerations.
The first one concerns the theme of scale as a methodological theme. The project scale and measure theme is in the *Bioclimatic regeneration of an industrial urban fringe* by Mariana Pereira, Cecilia Cempini, Pablo Gamboa, and Valentina Dall'Orto.
As described at the beginning of this contribution, the proposal is linked to the complex characteristics of urban fringes. The multi-scalar approach being adopted reveals the possibility of stimulating a dimension between the city and the single building, where the action on the latter requires a system with the scale of the neighborhood, primarily to address fragilities such as the heat island problem. Therefore, adaptive actions confronted by the project are validated only through a continuous dialog between the scales, thus renewing the need for an approach to the intermediate scale in which dynamics between building and urban design constitute architecture.
Identifiable in all four projects but foundational for the *De Polluting Rogoredo. Renewing an urban fringe toward zero pollution* project by Jiaxi Li, Rose-Ann Mishio, and Sara Anna Sapone, who raises its methodological need, is the theme of 'toolkits'. Toolkits are framed as a design method, presenting a series of actions proposed as 'open solutions' for specific areas on the territory. However, their response to localized problems is not intended as generic actions. Still, they are specific enough to direct the project towards guidelines, which open to precise urban scenarios capable of weaving a new common narrative. It would be a mistake to think these toolkits can be generalized for any context. Instead, they are open to the possibility of identifying «the minimum action»[14] (Gregotti, 1966: 91) that frames the project concerning its operability within a context strongly stratified and modified, between urban and rural spaces, in response to specific fragilities. Here the architectural operation is revealed in the possibility of acting by reconstituting figures in the public space, acting on the materiality of flooring and equipment, and even thinking about possible ground movements in composing new urban landscapes. And perhaps, through the study of these actions, it is possible to reflect on some issues about the theme of European Taxonomy.
If we suppose the latter proposes an assessment of adaptation and mitigation tools, the project research field has the task of building lists of actions and shaping potential urban scenarios, identifying which physical transformations can rethink the contemporary urban project.
Finally, the latest reflection that emerges through the *Slow and vitality community. The rebirth of Rubattino-Ortica area* by Elena Maj, Hailong Chai, and Liheng Zhu is the methodological importance of acting in public space. As suggested, recognizing in public space the fertile ground for urban adaptation to climate change sees a potential re-signification of the community space, where the community project is not conveyed only through the event or the ephemeral project. Still, it can constitute a new stratification of the city's space. Here architecture becomes a proposal to restore the shape and quality of the urban equipment to support virtuous community circuits.
Observing the design experimentation of the workshop in relation to the European framework makes some critical reflections necessary. Tackling the theme of urban space adaptation or climate change mitigation requires a systematic approach capable of incorporating European inputs but transforming them into project actions that must deeply adhere to the theme of space. Here, the technique theme is a component, certainly essential but insufficient to build the project.
The experiments proposed by the Ph.D. candidates combine technical and data issues with an attitude for critical analysis of urban contexts and a vision for the city described through the architectural project.
Only through the latter, necessarily based on values and an idea of space, can we rethink these marginal areas of cities. Redefining the relationship between rural and urban spaces, also in the face of the possibilities that European Taxonomy grounds, intertwining circular economy, nature, culture, design, identity, and space.
From this point of view, Kenneth Frampton's consideration gains relevance nowadays: «From a human, economic and ecological standpoint, there is perhaps no area of human activity that is more in need of a new relationship with nature than our current mode of haphazard suburban development […].» (Frampton, 1992: 342).
In the future, the construction industry and architecture may make an adequate contribution to the fight against the effects of climate change; this is a possibility if architectural design is a part of the UE Taxonomy.

Notes

1. The contribution delved into some themes that emerged during the doctoral course: *Fringes Renewal. Enhancing urban and peri-urban fragile areas*, held within the 2020-21 Ph.D. Course of Architectural, Urban, Interior Design (Politecnico di Milano, DASTU).
The New European Bauhaus policy ecosystem, in addition to the actions envisaged by the European Green Deal, integrates the field of action with further axes such as territorial policies, the social dimension, education and skills, the digital decade, research and innovation. For more information, see EU COM, 2021.
2. Luigi Spinelli's reflection mainly relates to urban contexts. However, some of his definitions of interstitial spaces can be extended to peri-urban ones, primarily when he defines them as 'troubled spaces'. In this sense, interstitial fragments become unclassified spaces or certainly less studied precisely because of the difficulty of being included in uniquely recognizable categories. For more information on this aspect see also Silva, 2021.
3. About the relationship between urban growth and ecological footprint, see Azhar, Gjerde, 2016. In this contribution, the role of leftovers is analyzed both in quantitative and qualitative terms, investigating their contribution to curbing the co2 emissions if they have undergone the process of regeneration and reinserted within urban systems.

4. These are: Climate change mitigation; Climate change adaptation; Sustainability and protection of water and marine resources; Transition to a circular economy; Pollution prevention and control; Protection and restoration of biodiversity and ecosystems (EU TEG, 2020: 2).
5. About the EU Taxonomy's tools, see also: EU TEG, 2020, in particular the 5th paragraph Summary tables of the Taxonomy. A broad set of actions and tools are analyzed relating to the architectural, landscape, and territorial project. The actions go from interventions in the built environment to soil reclamation and transformation.
6. Translated by the author. Originally in Italian as «le frontiere tra divisioni e tassonomie dicotomiche».
7. Translated by the author. Originally in Italian as «(eco-ottimizzate e tecno-mediate) tra habitat e ambienti».
8. For further information: Gausa M., 2022.
9. Translated by the author. Originally in Italian as «una interazione positiva».
10. Translated by the author. Originally in Italian as «topografie operative».
11. On the theme of urban fringes and their role, the reference is obviously made to the extensive existing literature, from the codification made by Gilles Clement in his Manifesto of the Third Landscape to the reports of Interreg funding programs with the outcomes of projects and experimentation on the theme of urban fringes. See, for example, https://keep.eu/projects/6386/Sustainable-Urban-Fringes--EN/.
12. For a further in-depth analysis concerning the issue of the soil project in the current research and practice, it is possible to read the recent publication of the Dutch magazine OASE entitled The Project of the Soil. The publication gathers a series of contributions which could be useful in a cultural perspective capable of enriching the actions of the European taxonomy relating to the adaptation of urban grounds.
13. Goals indicated in the Ph.D. course presentation form: Fringes Renewal. Enhancing Urban and Peri-Urban Fragile Areas, held within the 2020-21 DASTU Ph.D. AUID didactic program (Emilia Corradi, Cassandra Cozza, Valentina Dessì: 2020).
14. Translated by the author. Originally in Italian as «l'azione minima».

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