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Integrated Approaches to Ecosystem Services: Linking Culture, Circular Economy and Environment through the Re-Use of Open Spaces and Buildings in Europe

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Abstract: Green and blue infrastructure, nature-based solutions, and cultural and built heritage play a key role in enhancing ecosystem services provision and shaping urban quality and communities' wellbeing calling for an integrated approach to ecosystem services in urban policy and planning and decision-making. On the other side, under-used spaces and buildings have social, cultural, economic, as well as ecological functions and benefits, which are essential to sustainable urban development. The EU has been developing and implementing policies for an integrated approach to urban development and sustainable land use through the implementation of the Urban Agenda for the EU and fourteen associated Partnerships. Thus, it engaged a broad range of institutions and stakeholders across Europe in promoting local projects and sharing best practices on sustainable land use and nature-based solutions, the circular economy, and cultural heritage. This paper reviews the experiences of cities involved in the Partnerships of the Urban Agenda for the EU by illustrating how they related to different modes of ecosystem governance and associated challenges, discussing how three case studies integrate different dimensions of ecosystem services and regeneration in under-used areas and what type of knowledge as well as regulation and governance modes they have developed for supporting innovation in land use planning and management for urban ecosystem services. The results show that appropriate alternative regulations and policies are little explored and that cities adopt an integrated approach, combining cultural, environmental, economic, and social dimensions in their interventions, directly or indirectly enhancing the benefits of built and natural heritage and urban ecosystems in under-used areas. However, some issues, such as nature-based solutions and climate change, are still partially integrated into the projects while priority is given to the cultural, aesthetic, and economic dimensions.

Keywords: ecosystems governance; knowledge; regulations; Urban Agenda for the EU; under-used spaces; urban regeneration

1. Introduction

The pressing climate change challenges and ongoing socio-economic and health crises have increased the need for inclusive and sustainable public and green spaces in cities as a means to enhance ecosystem service provision via spatial planning [1–3] and new modes of governance [4,5].

Green and blue infrastructure, nature-based solutions (NBS), and built and cultural heritage play a key role in shaping urban quality and community wellbeing. On the other side, under-used spaces and buildings have social, cultural, economic, as well as ecological functions and benefits, which are essential to sustainable urban development. With the COVID-19 pandemic, the way of living in urban spaces has changed, the demand for accessible green and blue public spaces is rising, and the quality of local environments and social inclusion has gained more relevance.

In the EU and globally, there is a large amount of vacant and underused open spaces and buildings that are considered both a challenge and an opportunity to address the issues

mentioned above. The stock of industrial or military heritage sites in the EU has the potential to contribute to re-activate and enhance the multifunctional and multi-dimensional role of green spaces, ecosystems, and buildings, providing a broad range of ecological, economic, and social benefits to urban communities [6–8]. In addition to their environmental functions, underused spaces and buildings have physical and intangible cultural and natural heritage with recreational, aesthetic, therapeutic, and social and cultural interaction values having relevant impacts on residents' health and wellbeing, and on access to services, particularly for most vulnerable people. They can provide places for community engagement and participation in social and cultural events, and for social inclusion and interaction [9], contributing to reduce and prevent social, economic, environmental, and territorial inequalities (i.e., cultural ecosystem services).

At the policy level, greater emphasis on the multiple environmental and cultural dimensions has been posed in the Pact of Amsterdam and the Urban Agenda for the EU and later in the new Leipzig Charter, New European Bauhaus and EU Green Deal.

In connection with these policy frameworks and with the Decision V/6 of the Fifth Ordinary Meeting of the Conference of the Parties to the Convention on Biological Diversity [10], urban policies and planning are called on to increasingly adopt an integrated approach to ecosystem services, to find appropriate knowledge, tools, regulations and modes of governance and institutions to effectively integrate the different dimensions of ecosystem services, particularly in the vacant and under-used spaces.

The paper aims to improve the understanding of integrated approaches and governance of ecosystem services by reviewing experiences of cities involved in the Partnerships of the Urban Agenda for the EU, with the aim of combining sustainable land use, the circular economy, and cultural, built, and natural heritage in under-used spaces.

The following sections review the key literature on the need for an integrated approach to ecosystem services, then illustrate the key governance challenges addressed in the Partnerships of the Urban Agenda of the EU.

After presenting the method and the analytical framework based on different modes of ecosystem governance and related challenges, the paper illustrates the case studies selected under the relevant EU Partnerships and discusses insights regarding an integrated approach to ecosystem services and governance modes to enhance the understanding of innovative land use planning for improving under-used areas while addressing land take and urban sprawl challenges.

The paper found that the cases studies show how public institutions can work with stakeholders and citizens to simultaneously address environmental sustainability, social inclusion, and circular economy challenges.

The experiences from Poland and Spain also highlight the need for additional development and implementation of new forms of governance and regulations able to integrate the different dimensions of ecosystem services and support the re-use of underused or derelict spaces and buildings where ecosystems intertwine with old urban structures and infrastructure (e.g., industrial sites). The paper opens the door to future research on the "regulation of commons" as the institutions involved in urban policy and planning are struggling to find appropriate processes and forms to hand over the management of under-used public spaces and services to communities and social groups that are already engaged or interested in management of ecosystems and other services and spaces in under-used areas.

1.1. Integrated Approaches to Ecosystem Services

The debate on the ecosystem service developed since the 1970s has produced several approaches to assessing the benefits to society of nature for supporting decision-making. However, only in the 1990s did the integration of ecosystem services into policies and plans emerge with an increasing number of researchers from diverse backgrounds and disciplines advocating the adoption of an ecosystem services perspective for better decision-making [6].

This trend continued and intensified after the Millennium Ecosystem Assessment 2005 [11,12], which introduced a framework for analyzing socio-ecological systems, defining ecosystem services as:

> "Ecosystem services are the benefits people obtain from ecosystems. These include provisioning services such as food, water, timber, and fiber; regulating services that affect climate, floods, disease, wastes, and water quality; cultural services that provide recreational, aesthetic, and spiritual benefits; and supporting services such as soil formation, photosynthesis, and nutrient cycling. [. . .] The human species, while buffered against environmental changes by culture and technology, is fundamentally dependent on the flow of ecosystem services." [11]

Although this definition and the ecosystem categories are widely applied and have had a broad influence on the policy and scientific debate [13], there are diverging approaches questioning the appropriateness of these categories and how they may be applied in spatial planning [3] and policies. For instance, the "services cascade" approach distinguishes between ecological structures and processes created and the benefits that people eventually obtain. This is crucial to certain types of ecosystem services, such as cultural services, that may exist but not being accessible or their usefulness may be perceived differently in different contexts. Hence, for understanding the relevance and value of 'ecosystem service' it is essential knowing the spatial, social, and cultural context and values in addition to the structure and dynamics of ecological systems [14]. Ecosystem services are produced in cultural landscapes over which cities develop [15].

The cultural dimension of ecosystem services is recognized in several policy documents, such as the European Landscape Convention, Millennium Ecosystem Assessment, the Convention on Biological Diversity, and the Economics of Ecosystems and Biodiversity, and it provides insights into relationships between natural and cultural environments, to assess and quantify their value, and to integrate it into planning, conservation, and management [16]. At the same time, the concept of cultural ecosystem services raises awareness on the range of services that ecosystems provide to humans and promotes the assessment of ecosystems and landscape services as key knowledge for sustainable development and governance, participatory and environmental decision-making, environmental democracy, and environmental justice [17].

However, research on cultural ecosystem services and integrated approaches to ecosystem services remains relatively underdeveloped and there is a need for a deeper understanding of terminology, categorization and attribution of cultural benefits [18], of how culture and nature co-produce a "sense of place" [19], of how to integrate human values and cultural practices into ecosystem management [20], as well as analytical tools, policy instruments, and governance modes to operationalise cultural and integrated ecosystem service concepts and approaches.

Although the legacies associated with past uses of urban vacant spaces and buildings are known to affect ecosystems, there is a dearth of research investigating the ecological functions of vacant urban land [21], as well as a need to understand the social dimension and socio-cultural values of ecosystem services together with their biophysical and economic aspects [22–24], and to adopt a holistic approach covering a broader range of ecosystem services, widening the assessment methodologies incorporating participatory knowledge production and research, ecosystem-based planning, and governance and regulations.

Together with an integrated approach for ecosystem services participation, co-design, co-production, and co-management of space have been increasingly considered essential to foster inclusion and develop sustainable planning and management solutions and strategies. Public authorities play a key role in finding appropriate tools and governance models, in engaging citizens and relevant non-profit, private sector, and other relevant actors in developing and implementing plans and projects for the re-use or derelict spaces and buildings while enhancing ecosystem benefits.

1.2. Ecosystem Governance Challenges in the Urban Agenda for the EU

Within the extensive debate on the role of nature-based solutions and integrated approaches to ecosystem services, there is still a dearth of knowledge on how cultural, economic, and environmental dimensions have been integrated and operationalized in European cities and beyond.

In the last two centuries, most urban spaces in Europe have evolved substantially [25]. Although with differences between regions and socio-economic phases, in recent decades, many cities accumulated a large stock of vacant or under-used spaces and buildings (e.g., industrial sites and infrastructures, construction sites, and large health facilities such as mental hospitals) due to the economic and social transformation processes and policy changes [26–28]. The large amount of vacant and under-used open spaces and buildings represents both a challenge and an opportunity for developing integrated approaches to ecosystem service, for combining sustainable land use, circular economy, and cultural revival and social inclusion. These opportunities have been in some cases exploited through projects and experimentations led by citizens, community groups, private sectors, universities, public authorities or a partnership of these actors.

However, a comprehensive review of plans and projects exploring the potential of an integrated approach to ecosystem services is lacking. Similarly, while a few recent efforts have been made to illustrate what an ecosystem services planning approach might entail [29], an appraisal of the implications of the existing experiences adopting a holistic approach to ecosystem services for urban policy and planning is missing. This paper contributes to address these lacunae by reviewing initiatives and projects from relevant actions of three of the 14 Partnerships of the Urban Agenda for the EU: the Culture and Cultural Heritage Partnership and the strictly connected Sustainable Use of Land and Nature-based Solutions and Circular Economy Partnerships. The Partnerships of the Urban Agenda for the EU have been introduced in the EU programming period 2014–2020 to engage cities, Member States, the European Commission, NGOs and other stakeholders to work together on the development and implementation of Actions to address cities' challenges while contributing to the green and digital transitions objectives among others. The review addresses the types of solutions, plans, regulations, and knowledge innovations introduced for the sustainable use and management of under-used spaces within these actions.

Addressing the above mentioned gap is essential to understand how to operationalise the ecosystem services concepts and to integrating their cultural, socio-economic and environmental dimension and benefits, as well as to understand the role of governance [30] and urban planning in the supply of and access to ecosystem services [4,31,32] and in supporting their sustainable management.

The Urban Agenda for the EU aims at involving urban authorities in achieving the three pillars of EU policy-making and implementation: better regulation, better knowledge, and better funding. For the purpose of this article, are considered the first two pillars as they are connected to challenges arising from two possible scenarios as observed by the partners of the Urban Agenda.

A first scenario, as illustrated also by the Coordinator of the Culture and Cultural Heritage Partnership of the Urban Agenda for the EU between 2014 and 2021, is when there is a group of active citizens or a community group with a strong interest in management and that recognises the value of an under-used space or building, and is possibly already using it informally. In this case, the local authority acknowledges the interest and commitment and through a participatory process can assign the management of the space or building to citizens, community groups, NGOs or other no-profit organisations. In the second scenario, the local authority is not aware of the location and conditions of under-used spaces of buildings and there is a need to acquire knowledge about them, in order to identify appropriate management strategies and interventions [33,34]. Thus, the challenges are to identify both appropriate processes and regulatory instruments for spaces that are informally managed, defining urban regulation for "urban commons" and tools to map the

under-used spaces, as well as building participatory decision-making processes to re-use and regenerate the spaces.

The local authority can collect, transformation and design ideas and options for under-used spaces, but in most cases doesn't have the possibility to delegate or assign the management of spaces or buildings to citizens, NGOs, associations or community groups, due to the public procurement rules and lack of alternative tools or regulation. However, there are some cases where a regulation of "common goods", as place of value and interest or identity for a community, has been created, defining innovative urban regulations, such as "civic pats", "collaboration agreements", or "citizenship agreements", for the development or reuse of public buildings and areas[1].

These cases follow a trend that is supported by scholars arguing that a well-structured participatory process, open to all the relevant stakeholders and with clear objectives of providing public services and space for common interest, can be a valid alternative to predominant and market-based approaches, such as procurement [35], and can lead to the identification of an appropriate "common good" (or urban commons) regulation for the assignment of management or service provision to a diverse range of suitable actors.

Although, there is an extensive debate on urban commons and ecosystems commons, this paper rather than engaging with this literature focus on illustrating experiences from selected case studies to understand what insights they provide on alternative regulations, governance, and knowledge production for an integrated approach to ecosystem services in under-used spaces and buildings.

2. Materials and Methods

The paper uses a qualitative case study methodology with a descriptive aim. It analyses three projects implemented under the selected Partnerships of the Urban Agenda for the EU in Poland and Spain, with the aim to understand:

a. the extent to which projects under the selected Partnerships integrate cultural, social, and environmental dimensions of ecosystem services and adopt a holistic approach

b. what knowledge and regulations have been experimented with, developed, and applied in the projects to foster the integration of the different dimensions and types of eco-system services, and

c. what insights do they provide for informed policies and planning to enhance the benefits of ecosystems.

The projects have been selected together with the Partnership coordinator and action leader and with the contractors supporting the European Commission Directorate-General for Regional and Urban Policy in the implementation of the Urban Agenda for the EU[2]. The data regarding the project's objectives, initiatives, and interventions have been collected through desk review of action plans, of handbooks and reports delivered under the relevant Partnerships and actions, of project documents, and through interviews with a Partnership coordinator and action leader of the Partnerships on Culture and Cultural heritage, and on Sustainable Land-use and Nature-based Solutions and Circular Economy of the Urban Agenda for the EU.

To address the three points above the case studies are analysed using four governance modes as categories adapted from Primmer et al., 2015 and Winkler et al., 2021 [4,5,30]: technical and knowledge governance; collaborative and participatory governance; transformational governance and regulatory governance. These categories are linked to four corresponding challenges: the knowledge challenge, engagement and empowerment challenge, and policy and regulation challenges (Table 1).

Table 1. Governance modes adapted from Primmer et al., 2015 and Winkler et al., 2021 and linked to ecosystem services integration challenges.

Governance Mode	Ecosystem Service Integration Challenge
Technical and knowledge governance	Knowledge challenge
Collaborative and participatory governance	Engagement and empowerment challenge
Transformational governance	Policy challenge
Hierarchical/Regulatory governance	Regulation challenge (commons)

This analytical framework aims at providing an insight into different strategies and initiatives for integrated ecosystem services in under-used used spaces and buildings. It allows to investigate, first, how cultural, environmental, and socio-economic dimensions are integrated in the analysed projects and what form of governance was adopted; second, how the projects and interventions addressed the knowledge and participatory challenges, particularly in terms of community engagement and empowerment, and the regulation challenge in terms of the regulation of commons.

The following session presents the results from the review of the projects of selected Partnerships and related actions of the Urban Agenda for the EU: the Partnerships on Sustainable Use of Land and Nature-based Solutions and that on Circular Economy, and the Culture and Cultural Heritage Partnership.

3. Integrating Sustainable Land Use, Circular Economy and Cultural and Natural Heritage

The interview with the Leader of Actions 3 and 9[3] of the Urban Agenda Partnerships on Sustainable Use of Land and Nature-based Solutions and the Circular Economy provided insights on projects and initiatives at the interfaces between the identification and management of under-used land and the re-use of public spaces and building under the circular economy framework (Catalonia). The "Handbook Sustainable & Circular Re-Use of Spaces & Buildings" [36] prepared under the two complementary actions of the Partnerships mentioned above highlighted that the re-use and revitalisation of under-used urban areas can be fostered through appropriate laws or policy, or through specific programmes targeting the re-use and management of spaces and buildings. Cities and urban authorities engaged in the development and implementation of solutions for the circular reuse of space and buildings and the transition towards circular economy, and in exploring methods for mapping and collecting best practices in the management and activation under-used land and spaces.

The activation of under-used land and the land recycling [37], including the redevelopment of previously developed land, ecological upgrading of green urban areas, and re-naturalisation of land, is closely linked to the sustainable re-use of brownfields and former industrial sites. This circular re-use of land in urban or peri-urban areas aims at avoiding land take and preventing urban sprawl by providing a competitive alternative to the development of greenfields.

For activating under-used spaces to exploit their potential for reducing land take and soil sealing, it is essential that public and private actors and stakeholders establish a collaborative partnership and that relevant actors (from both public and private sectors) have adequate data on under-used land and on how it could be designed, both for temporary uses, and long-term and permanent land uses. This knowledge is strictly linked to cultural values and local culture and built, natural, and cultural heritage as triggers for the identification of sustainable and inclusive solutions and for community engagement in design and implementation phases.

In this perspective, the interview with the Coordinator of the Partnership on Culture and Cultural Heritage, provided experiences on the revitalisation, management and activation of citizens and social groups through cultural heritage, including cultural services in under-used areas (Murcia), with a focus on Actions 2 and 3[4] of the Partnership.

The following section, integrating inputs form the Action Leader of the Sustainable Use of Land and Nature-based Solutions and the Circular Economy, and from the Coordinator of the Partnership on Culture and Cultural Heritage, with data from EU reports and projects' documents review, illustrates the implementation of strategies and solutions developed in Poland with the National Model for urban revitalisation and in Catalonia and Murcia in Spain.

3.1. Integrated Regeneration Programme in Poland: National Model for Urban Revitalisation

Since 2015 Poland have been adopting a new approach to urban revitalization defined as an upgrading process of derelict and under-used areas which integrates actions for the local community, spaces, and economy and activation of local stakeholders in the revitalisation program. An Act on revitalisation was adopted in 2015 and stated that municipalities should identify their derelicts and under-used areas and buildings and special revitalisation zones. Under this policy framework the Ministry of Investment and Economic Development launched the Model for urban revitalisation (regulation challenge/hierarchical-regulatory governance) subsidising projects for more than 40 mln PLN (about 9 mln EUR) to support cities in implementing innovative ideas and share knowledge on revitalization processes. The programme included a call for the proposal of models for revitalisation activities in one of the following areas of intervention: social policy, participation in public life, housing, shaping of space, environmental protection, protection of heritage, stimulation of the economy, urban mobility, and financing of revitalisation. The Ministry received about 250 applications from different municipalities with city status and selected the 23 best projects[5]. Three of the selected cities required large-scale revitalisation interventions and were provided with grants and expert support by the Ministry in implementing pilot projects on participation in public life, housing policy, shaping of space, and revitalization management.

One of the selected projects, "New Downtown of the City of Ełk formula for revitalization", focused on the participation, activation, and creation of new public spaces as three key pillars of revitalisation. The city of Elk built a model to engage residents both in the revitalization programme and related projects (participation), a Model School of Social Animator and Educators (activation) and developed the concept of Social Revitalization Centre, a programme for managing housing both addressing revitalization challenges and creating inclusive public spaces (new public spaces). The Model School of Social Animator and Educators implemented small projects in tenements' backyards such as the organisation of a parade of "Enlightened" with residents and local theatre to illustrate and promote the results of the project. The event was organised by Elk Association Active foot, Human Foundation and the Forum Institute Social Animators LEX, a consortium of NGOs. Since August 2017, the city has implemented Street activities (*streetworkerów*) and 10 mini-projects together with the residents for a value 50,000 PLN (about 10,000 Euro).

Under the framework of the project the local authority called for initiatives for increasing residents' engagement in activities for improving their living environment; for leisure, sports, culture and education, health care services and integration of seniors, children and youths social groups; for improving knowledge and awareness on environmental issues, such as green transportation, pollution and sustainable use of green areas and on the management of urban space and engaging community in urban planning decision-making (engagement and empowerment challenge/collaborative and participatory governance; regulation challenge/hierarchical-regulatory governance). In addition, corporate social responsibility (CSR) activities have been performed for building and improving relationships between business actors and local community and local authorities.

The city of Lodz with the project "On the Trail of Textile Architecture. Revitalisation of *Księży Młyn*" was selected for one of the three large scale projects under the urban revitalisation programme. The project consists in the revitalisation of the 6.5-hectare area of Priest's Mill (*Księży Młyn*) a historical settlement and conservation of 25 city-owned multi-family workmen's residences built in the 1870s and 1880s by the owner of a textile

factory, as well as the conversion of 15% of the residential buildings into spaces for retail, social, and cultural activities such as dynamic artist workshops.

The project also created an original model of mediator with mediation, conflict and management competences applied to eight priority revitalization projects and for engaging residents of 700 housing units. The team of mediators first supported residents' in finding solutions to address their everyday life problems, then expanded its scope to socio-cultural animation activities for engaging and activating residents and a variety of stakeholders (e.g., administrators of infrastructure networks, artists, police), as well as widening the areas of intervention of the revitalisation's projects. Mediators also manage the involvement of employees in activities, such as cross-financing, cooperation with entrepreneurs, communities' participation in local initiatives, and the creation of a network between institutions (engagement and empowerment challenge/collaborative and participatory governance).

Together with the mediator supporting residents in change and relocation, consultation and participation activities relied on local community organisers for connecting, activating, and working with residents and institutions to create an integrated neighbourhood, and on an area manager for representing residents and institutions, and monitoring and taking part to all meetings and activities relevant to the future of local residents, workforce and organisations and enterprises. The project allowed the historic tenement houses to regain their residential function with contemporary living standards and preserve the open green public space designed in the 19th century and the original urban fabric of the area. Most of the apartments are city-owned and include communal flats, providing shelter to those who cannot afford to rent an apartment on the open market and also create social mix. The continuous and direct interaction with residents helps to prioritise those who need a house most and contributes to enhancing ownership and building trust in local authorities.

The project turned under-used areas, considered unsafe and derelict, into one of the most interesting spaces in the city due to their environment, atmosphere, and historical characteristics. It contributed to the circular re-use of vacant properties, introducing new functions and flexible uses within under-used buildings and spaces originally designed for other activities, and creating job opportunities and service delivery with a positive social impact.

The transformation is also considered an example of sustainable urban action as it preserved the urban fabric and the historical features creating "Monuments of History" always involving the citizens in the process. It illustrates the key role and potential of local residents and their knowledge and relationship with the physical and cultural heritage of the area, in the planning and implementation of revitalization activities, overall including: building renovation and modernisation, open space management; spatial transformation of residential building into spaces for productive activities; establishment of a Social Integration Club, Residents Club, social economy entities, artist workshops, programming social, artistic and cultural projects. The activities are integrated with Lodz's major initiatives and plans for the restoration of green areas and the creation of new parks (e.g., the Lososiowa street in Lodz was established in 2014, an old industrial area).

The concept of the Blue-Green Network was adopted to guide integrated planning and management of green and blue areas in Lodz, making the city's blue-green infrastructure a key pillar of Lodz's urban resilience. Ecohydrological measures were introduced as a part of the small-scale water retention programme for Łódź and the Blue-Green Network project, including new stormwater management for enhancing water retention potential of the city's waterways and a pilot project for the renaturalisation of the Sokołówka River[6] [38]. The city of Lodz also aimed at integrating biodiversity and culture in planning and managing the urban green spaces of under-used areas, the concept of biocultural diversity as reflected in the Green Circle of Tradition and Culture (GCTC) emphasises that green spaces are shaped by cultural processes as they result from historical cultural and land use practices. The way in which land was managed by different social groups and for different purposes in the past is reflected in the green areas the city has today [38].

In this perspective, green spaces and historical palaces and factories with their historical parks and rivers are examples of biocultural diversity, being used by different groups of people. Within the GCTC, the sites *Księży Młyn* (Priest's Mill), with its under-used and well-preserved factory, buildings, workers' residences, river and lake, and historical parks, is emblematic of the integration of natural and cultural heritage reflecting historical land-use [39].

3.2. Integrating Sustainable Land Use and Circular Economy in Catalonia, Spain

INCASÓL, the Catalan Land Institute of the Government of Catalonia, implemented several initiatives and programmes for the regeneration of vacant industrial sites, revival and protection of cultural, built and natural heritage, and green infrastructure. They included the support administrations in the design and implementation of an Urban Redevelopment Programme; management and implementation of large regeneration projects of vacant or partially vacant industrial sites (Industrial Colonies), or tailored interventions on specific sites mostly owned and managed by the Ministry of Planning and Sustainability.

3.2.1. Catalonia Urban Redevelopment Programme

The Catalan Land Institute, Incasòl (*Institut Català del Sòl*) has supported a long-standing Urban Redevelopment Program to provide support for particularly urban development issues to administrations at different levels (regulation challenge/hierarchical-regulatory governance). The programme identifies municipalities with social problems and urban problems and, e.g., helps municipalities with high-density issues in redeveloping public spaces and buildings that are fully or partially owned by the public, transforming them into new sustainable and accessible areas. The transformation may include the relocation of some buildings or residents, or demolition activities to provide appropriate public and green spaces. All the projects take into account environmental sustainability (e.g., in terms of building material and energy efficiency) and aesthetic standards (e.g., improving street views and cityscape) and aim to provide social mix to avoid creating exclusion and segregation between neighbourhoods. The programme has been working in 19 neighbourhoods and the realisation of projects takes 4–6 years. The programme combines the regeneration of public open green spaces with the realisation of new affordable residential areas. It includes new affordable housing for rent, usually built on municipal land targeting both residents with no access to social housing or struggling in accessing the house marked.

3.2.2. Industrial Colonies: Regeneration of Colonia Sedó

Incasòl also implemented regeneration projects in two under-used or abandoned industrial settlements, the former textile factories of Colònia Güell and Colonia Sedó. They have been regenerated mixing different uses, including industrial use, housing, and green infrastructure. Colonia Sedó, covers an area of 427.46 ha and is located in the Esparraguera municipality 35 km away from Barcelona. It was built in the mid-19th century on the banks of the Llobregat River integrating housing, facilities and services (shops, schools, a church and social centre), and various types of infrastructure for the workers of the textile factory. The residential part of Colonia Sedó was acquired by Incasòl (i.e., Government of Catalonia) in 2003 and the Colony is now a 44% public owned and 56% private site owned by several small and medium-sized companies. To address the obsolescence, specialization, and segregation issues of the Colony site, Incasòl has worked together with the City Council to develop a strategy (regulation challenge/hierarchical-regulatory governance) for the rehabilitation of the residential complex and of the old Fonda's building, the old inn used to provide meals and accommodation to residents. Colonia Sedó was also part of the EUROPAN project[7] on "Reinventing Rurality and Productive Heritage" with the aim to exploit its significant historical-heritage value and the role of the natural environment and resources, such as water, to integrate and connect the industrial urban fabric with the cultural heritage and the sustainability and circular economy dimension. Environmental

and heritage-related objectives have been combined through initiatives for renewable energies and the sustainable use of water resources and old hydraulic infrastructure, for the integration of urban agriculture into the open spaces in residential areas, for enhancing the connectivity between the existing urban fabric and surrounding areas of natural interest (e.g., protected natural areas of the Natural Area Plan and under the Habitats and Birds Directive Sites Montserrat-Roques Blanques-riu Llobregat), and for integrating conservative actions of historic heritage-listed assets (e.g., old aqueduct listed in the Inventory of Catalan Architectural Heritage) with the realisation of new buildings and uses [40].

3.3. Integrating Cultural and Natural Heritage Management and Revitalisation in Murcia, Spain

The Municipality of Murcia, in Spain, led Actions 2 and 3 of the Culture and Cultural Heritage Partnership of the Urban Agenda for the EU, aiming at the revitalisation, management, and activation of culture and cultural sectors, public spaces, and cultural heritage, including cultural ecosystem services in under-used areas. The actions refer to the two possible scenarios and related challenges described in Section 1.2. They include challenges of identifying both analytical tools and participatory decision-making processes, and regulatory instruments for under-used spaces and buildings that are informally managed.

Murcia has been a really active administration on Culture and Heritage, Murcia City Council implemented the Urban DNA initiative for the economic and social revitalisations of three neighbourhoods: El Carmen, Sta. Eulalia, La Paz. The initiative is part of the City Strategy 2020 aimed at the revitalisation and regeneration of neighbourhoods based on the specific physical, social, and cultural peculiarities and identity of each neighbourhood.

Urban DNA includes physical interventions and social innovation actions to improve the urban environment and social relations and design new services within the neighbourhoods, while introducing circular re-use of space. A broad range of actors, including almost all the departments of the Municipality of Murcia (urban development, participation, public works, decentralization, institutional relations, urban mobility, urban security, environment, health, economy, culture, development of European projects), universities, private sector, local associations, community groups, and residents, were involved in a five-step process, representing a governance model for the reuse of spaces and buildings.

Phase 1 was aimed at understanding the contexts and focused on multiple spatial and socio-analyses of the neighbourhoods, resulting in a series of urban atlases (knowledge challenge/technical and knowledge governance). Phases 2 and 3 of co-design consisted of participatory needs assessment and community activation respectively (engagement and empowerment challenge/collaborative and participatory governance). Residents and different social groups and stakeholders first engaged in various group works, analyses, and debates to integrate the outputs of Phase 1 with inputs, ideas or project proposals developed in phase 2, and then, in a second stage of co-design, provided with technical support of the local authority in the implementation of the proposed social, cultural, urban interventions (Phase 3). In Phase 4, citizens and community groups and relevant public bodies worked together to realise the interventions defined in the previous phases (e.g., planting trees or improvement of public spaces and urban infrastructure). In Phase 5, the Municipality of Murcia assigns the management of the project and of the space to a designated association and neighbourhood group, while the urban authority remains responsible for exceptional maintenance of the interventions (regulation challenge/hierarchical-regulatory governance).

Following this governance model, projects and interventions integrated socio-economic, cultural, and environmental dimensions of ecosystem services. In El Carmen neighbourhood, some of the interventions included the realisation of new garden, Painter Pedro Flores, a green space of 2500 m^2, with improved accessibility and children's innovative playground, landscaping and tree plantation, and irrigation infrastructure.

4. Results

From the review of the three cases, it emerges that all the cities adopt an integrated approach combining cultural, environmental, and economic and social dimensions of their intervention, directly or indirectly enhancing the benefits of built, cultural, and natural heritage, as well as the circular re-use of spaces, buildings, and urban ecosystems in under-used areas.

Lodz and Elk in Poland are also examples of the integration of affordable housing, regeneration, as well as the revitalization and re-use of open public space. The Catalonia redevelopment programme and factory regeneration integrates social dimensions with the environmental dimensions, linking access to housing with access to cultural and environmental services (e.g., demolition in dense urban areas for creation of green public spaces). However, some issues, such as nature-based solutions and climate change, are still moderately integrated in the projects, while priority is given to the cultural, aesthetic, and economic dimensions of the interventions.

All the cases studies widely address the engagement and empowerment challenge by proposing different modes of collaborative and participatory governance. The case of Murcia shows an adaptive collaborative governance approach focused on collective learning and bottom-up participation, originating from actors who affect or are affected by the conditions of ecosystems and under-used spaces and services. This approach also translated into a "learning by doing" process with changes and improvements made during the project implementation (e.g., issues in the coordination between companies and municipal services led to introducing changes intensifying coordination efforts).

In all the cases studies, the knowledge challenge is also addressed, collecting and operationalizing knowledge on the project site/s and community aspirations for the transformation of the space (technical and knowledge governance). However, only Murcia and Lodz define a specific implementation process for integrating technical and community knowledge to strengthen the collaboration of public authorities, citizens, community groups, the business sector, and other relevant stakeholders in decision-making (Murcia), and create dedicated roles (mediator in Lodz) to facilitate and manage the interventions. In Murcia, the citizens' engagement, and collaboration between local administration and residents, were crucial for the design and implementation of the interventions. The Urban DNA initiatives provided opportunities to raise awareness and enhance community knowledge and planning capacity on the circular reuse of public spaces and buildings. The direct engagement and co-design with citizens, community groups, research and education institutions, as well as the private sector, was directed to help to attribute value to local, place-based, social, cultural, economic and environmental features and generate opportunities for economic development, social innovation, and environmental sustainability.

Although the analysed projects introduce procedural and organisational changes, they do not develop specific new regulatory mechanisms or regulation of commons. In the case of Catalonia, it emerges how the state actors and formal institutions play a major role in project design and decision-making. There are hierarchical, vertical interactions and collaboration (hierarchical/regulatory governance) and technical support, involving Incasól and the Ministry of Planning and Sustainability, and the city administrations in the development of regeneration and re-use strategies.

The case studies provide limited evidence of transformational governance mode, activities, or strategies for catalysing the behavioral change of relevant actors and policy changes are not integrated in the projects and programmes, limiting the scope of the ecosystem integration approaches.

5. Discussion and Conclusions

The results show that there is a strong integration of cultural, environmental and socio-economic dimensions, with an emphasis on the cultural value, environment and ecosystems, and land recycling. However, the focus on the role ecosystem services is still

partially explored while more attention is given to the urban regeneration and brownfields redevelopment rather than re-naturalisation.

The project interventions address the knowledge and participatory challenges, providing different solutions and strategies, however the regulation and policy dimensions are mainly limited to the collaboration among different public institutions and levels of governance. Alternative tools and regulations, such as common good regulations, are little explored and implemented in the Partnerships. Future research, both case studies and theoretical reviews, concerning alternative processes and forms to assign the management of common spaces and services to communities and social groups that are already engaged or interested in management of ecosystems in under-used spaces, would provide valuable insights for innovation regulations and urban and land-use planning.

The projects illustrate the key role of the public authorities and institutions in addressing the sustainable challenges where the market has no interest to intervene. However, this may generate constraints for a bottom-up approach to effectively engage and empower segregated social groups and citizens, underpinning gentrification.

Concerning the relevance of the results for urban and land-use planning and management, it should be considered that the review of the case studies is limited to three experiences from the Partnerships of the Urban Agenda for the EU, and that most of the projects focused on the re-use of public spaces and building. A systematic review of additional experiences within and beyond the EU Partnerships, also including the exploration of the potential of the re-use of private spaces and buildings, would be very relevant.

In addition, further research, including quantitative and detailed data on funds and resources of the analysed projects and programmes, on the dimension, land use, and land cover of the areas of interventions, on size and composition of the governance networks and structures, and on expected or measured social and economic impacts and targets, would provide significant insights concerning innovative urban planning, useful to operationalise an integrated approach to ecosystem services in Europe.

Notes

[1] Some examples of this innovative urban regulations are in the Emilia Romagna Region in Italy where, in line with regional Law, the Municipality of Reggio Emilia is experimenting "citizenship agreements" and co-design actions for the reuse of urban assets, spaces and buildings; and in the city of Naples, Turin and Salerno, where the local authorities are developing local regulations to introduce "collaboration pacts" as a tool to assign the management of spaces or buildings to citizens or community groups following a specific procedure to include temporary uses of the "common goods" and require that management objectives are in line with the public interest and spaces and activities are open to the public.

[2] Framework Contract 'Support to the implementation of the Urban Agenda for the EU through the provision of management, expertise, and administrative support to the Partnerships', signed between the European Commission (Directorate-General for Regional and Urban Policy) and Ecorys.

[3] The interview with the Action Leader of Actions 3 "Identifying and managing under-used land of the Sustainable use of land and nature-based solutions" and Action 9 "Manage the re-use of buildings and spaces in a circular economy under the complementary", of the Urban Agenda Partnerships on Sustainable Use of Land and Nature-based Solutions and Circular Economy, in addition to the projects in the selected case studies, illustrated the complementarity and the collaboration within the two actions.

4   Action 2 is "Partnership focus on Street Invasion, Atomisation and Cultural Reactivation", and Action 3 is "Cultural Hubs for Innovation, Modernisation and Enhancement".

5   The 23 City selected in the programme are Chorzów, Dabrowa Górnicza, Dobiegniew, Ełk, Grajewo, Hrubieszów, Konin, Leszno, Lublin, Milicz, Opole Lubelskie, Rybnik, Słupsk, Stalowa Wola, Starachowice, Szczecin, Warszawa, Włocławek, Wrocław, Żyrardów, Bytom, Łódź, Wałbrzych.

6   The Pilot project is part of the EU SWITCH programme (Sustainable Water Management Improves Tommorow's Cities' Health) https://cordis.europa.eu/project/id/18530 (accessed on 4 November 2021).

7   Information about the EUROPAN Project and Colonia Sedó are accessible at: https://www.europan-europe.eu/en/session/europan-16/site/esparreguera-colonia-sedo-es#specific-documents (accessed on 4 November 2021).

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