


## Article

# Terraced Landscapes Regeneration in the Perspective of the Circular Economy

Antonia Gravagnuolo <sup>1,\*</sup>  and Mauro Varotto <sup>2</sup>

<sup>1</sup> CNR IRISS Institute for Research on Innovation and Services for Development, National Research Council, 80134 Napoli, Italy

<sup>2</sup> Department of Historical and Geographic Sciences and the Ancient World-DiSSGeA, University of Padova, 35123 Padova, Italy; mauro.varotto@unipd.it

\* Correspondence: a.gravagnuolo@iriss.cnr.it

**Abstract:** Terraced landscapes were for centuries forms of sustainable and multifunctional land management, results of a long and intimate relationship between peoples and their environment. They demonstrated a rich cultural diversity and agrobiodiversity through sustainable land-use systems. These productive cultural landscapes in many cases were expressions of a pre-industrial circular model of rural development, where no resource was wasted. However, not all terraced landscapes have to be considered sustainable in themselves: in recent times, the terraces have undergone changes that have threatened their sustainability with abandonment and degradation as well as exclusively productive exploitation. This paper explores whether and how terraced landscape can recover an active role in modern society, analyzing emerging terraces recovery practices from the perspective of the circular economy. Innovative circular and productive uses of abandoned terraced landscapes aim at reducing the waste of natural and cultural resources, enlarging the lifetime (use value) of landscapes and preserving cultural and natural values for present and future generations. Results show that new functional uses of terraced landscapes are able to enhance in different ways their role as “middle landscapes” or places of mediation among economic, ecologic, ethical and aesthetic needs through circular adaptive reuse practices, becoming key drivers of new “circular” economies and a new pact between rural and urban regions.

**Keywords:** terraced landscapes; circular economy; middle landscapes; cultural heritage; cultural landscape; adaptive reuse



**Citation:** Gravagnuolo, A.; Varotto, M. Terraced Landscapes Regeneration in the Perspective of the Circular Economy. *Sustainability* **2021**, *13*, 4347. <https://doi.org/10.3390/su13084347>

Academic Editor: Antonio Boggia

Received: 9 February 2021

Accepted: 30 March 2021

Published: 14 April 2021

**Publisher's Note:** MDPI stays neutral with regard to jurisdictional claims in published maps and institutional affiliations.



**Copyright:** © 2021 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

## 1. Introduction

Terraces are among the most evident human signatures on the landscape, and they cover large areas of the Earth. For centuries, agricultural terraces provided soil for cultivation on mountain areas and a protection structure against landslides. Sustainable land management practices contributed to maintaining multiple natural and rural areas functions, especially for water management and protection from hydro-erosive processes and events [1,2]. Terraced landscapes were in the past forms of sustainable and multifunctional land management, results of a long and intimate relationship between peoples and their environment. They demonstrate a rich cultural diversity and agrobiodiversity through sustainable land-use systems, as expressions of a pre-industrial circular model of rural development, where no resource was wasted.

Terraced landscapes are living systems that are present in many forms in the UNESCO World Heritage List and in the FAO list of Globally Important Agricultural Heritage Systems (GIAHS) “combining agricultural biodiversity, resilient ecosystems, traditional farming practices and cultural identity” [3]. They are considered “the most important landscape organization system in the Mediterranean area” [4], demonstrating a rich cultural diversity and agrobiodiversity through sustainable land-use systems [5]. However, not all terraced landscapes have to be considered sustainable in themselves. These historic

rural landscapes are threatened by abandonment due to many forms of obsolescence: economic, functional, physical and technical. Above all, in recent times, the terraces have undergone changes that have threatened their sustainability with abandonment and degradation as well as exclusively productive exploitation. This shift in production has also led to the abandonment of large agricultural areas with loss of productivity, ecosystem and hydrogeological functions and cultural values. The loss of economic convenience of traditional agriculture with high cultural embedded value in historic rural landscapes is coupled with the global trend of migration from rural to urban areas, increasing the risk of irreversible loss of multiple functions and values.

As stated by Tarolli et al. [6], “the purpose of terracing and its effect on hydrological processes depend on geology and soil properties [7], but they are generally built to retain more water and soil, to reduce both hydrological connectivity and erosion [8–10], to allow small machinery and ploughs to work in better conditions, to make human work on the slopes easier and comfortable, and to promote drainage and irrigation. Terraces reduce the slope gradient and length, facilitating cultivation on steep slopes; they increase water infiltration in areas with moderate to low soil permeability [11,12], controlling the overland flow (quantity) and velocity (energy), thereby leading to a reduction in soil erosion [13–17], with positive effects on agricultural activities”. They can be seen as an important source of ecosystem services [18]; they can serve as habitat-providers and offer ecological corridors for biodiversity [19]. The terraced systems on steep slopes are, however, very susceptible to hydrogeological instability if not carefully managed [6]. The abandonment of cultivated land (and thus the lack of maintenance), the increase of rainfall intensity due to climate change, and the introduction of heavy or non-optimal mechanization, worsened their susceptibility to erosion [17,20,21].

In the Alpine region, the EU Interreg project ALPTER [22] and the MAPTER surveys [23,24] in Italy documented the massive abandonment of terraced landscapes and identified the main causes of their degradation, mainly the abandonment of traditional agriculture and sustainable land management practices. In addition to environmental, social and economic values, terraced landscapes have a high cultural value, many of them being included in the UNESCO World Heritage list as “cultural landscapes” (e.g., Cinque Terre and Costiera amalfitana).

How can terraced landscape recover an active role, beyond a sort of “museum exhibition”, in modern society’s search for sustainability? How can agriculture in terraces be “convenient” again? Innovative circular and productive uses of abandoned terraces aim at reducing the waste of natural and cultural resources, enlarging the lifetime (use value) of landscape and preserving cultural and natural values for present and future generations. In some peripheral rural areas, new forms of sustainable development based on restoration and valorization of the stone heritage have already been observed, as described in the manifesto “Terraced landscapes: choosing the future” [25]: this can be achieved through a new multifunctionality of landscape, using the tools that the contemporary society offers, such as web-based networking and integrated marketing, shared tourism services and social innovation. In some areas, terraced landscape has become an added value that contributes to sustainability, food security and community wellbeing.

This paper explores novel blueprints for economic, social and environmental value creation in terraced landscapes today often affected by decay and abandonment, highlighting their potential as economic, social and environmental catalysts for regeneration, sustainable development, economic growth and improvement of people’s wellbeing and living environments. This paper focuses on exploring whether and how terraced landscapes can be an example of circular territorial organization, analyzing diverse examples of terraced landscape management practices and comparing them to well-established circular economy principles and adapted circularity drivers identified. Results show that new functional uses of terraced landscapes are able to enhance in different ways their role as “middle landscapes” or places of mediation among economic, ecologic, ethical and

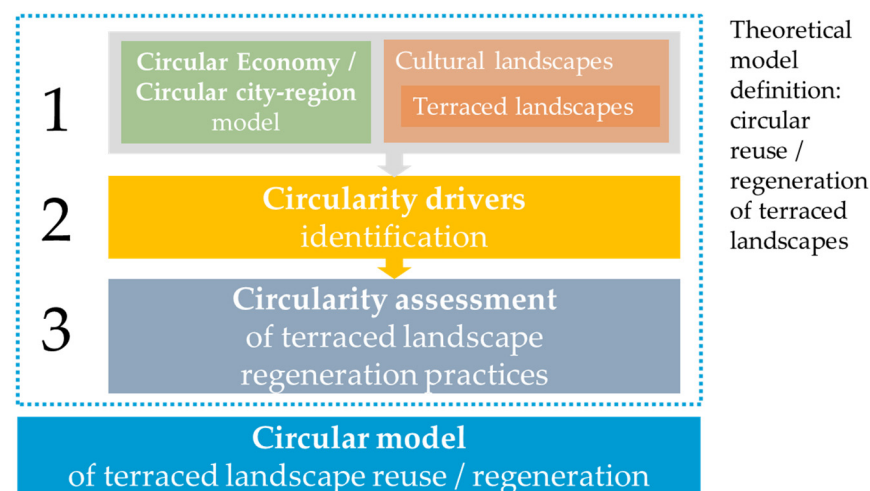
aesthetic needs through circular adaptive reuse practices [2,22], becoming key drivers for new “circular” economies and a new pact between rural and urban regions [26].

## 2. Methodology

To identify circularity drivers of terraced landscape regeneration and explore innovative circular practices, a mixed deductive and inductive approach was adopted. The methodology applied is based on three main steps/phases:

1. Definition of the theoretical framework: conceptualization of circular economy and circular city-region definitions, and assessment of terraced landscapes functions and values, identifying the main aspects/factors of circularity transferable to terraced landscape regeneration;
2. Identification of specific circularity drivers for the assessment of terraced landscapes reuse practices in the perspective of the circular economy, towards an “ideal” circular regeneration framework for terraced landscapes, generalizable to cultural rural landscapes;
3. Description of circularity aspects in selected terraced landscape regeneration practices, identifying strengths and weaknesses/threats in the perspective of the circular economy and circular city-region.

The methodology applied is based on structured analysis of empirical evidence through terraced landscape regeneration practices, addressed particularly to policy makers that could take advantage of the knowledge systematized in this study to take more effective and informed choices for longer-term sustainable development through terraced landscape reuse/regeneration. Figure 1 synthesizes the methodological process followed in this study.



**Figure 1.** Scheme of methodological approach.

The following sections analyze the concept and implementation of circular economy and circular city-region in the context of the historic landscape and cultural heritage, as well as the attributes and values of terraced landscapes as “cultural” landscapes that integrate productive, ecological and cultural functions. Section 3 identifies five “circularity drivers” and presents the results of an initial assessment of terraced landscape regeneration practices. Finally, critical aspects of the circular framework for terraced landscape regeneration are discussed in Section 4, highlighting future perspectives for circular regeneration in terraced landscapes, applicable also for cultural/historic rural landscapes.

### 2.1. The Circular Economy

The Circular Economy (CE) is defined as a “system that is restorative or regenerative by intention and design” [27], a “regenerative” economic model that “takes the reusability

of products and raw materials and the resilience of natural resources as a starting point” striving for more sustainable production-consumption systems. It is achieved through cooperation and synergies/symbioses in production-consumption systems and territorial systems.

Circular processes can be defined as processes that “mimic the organization of natural systems, which are able to self-reproduce themselves and ‘support’ other systems at the same time” [28]. The Horizon 2020 CLIC project highlighted the need to identify circular business, financing and governance models for the adaptive reuse of cultural heritage and landscapes [29]. According to the CLIC project definition, circular models are here seen from a humanistic perspective, as a broad set of organizational practices, approaches, participatory processes and regulatory tools, which may be synthesized as “models”. These circular models, based on resource efficiency and synergic “closed loops” of value creation, are characterized by the goals of resources reuse, creation of economic value from wastes and enhancement of employment and capitals productivity at the same time [28,30,31].

As stated by Luigi Fusco Girard: “Circularization is a principle that can be applied to such issues as economic patterns (circular economy), but also to management systems or participative multi-level governance. Circularizing social and political processes includes fostering socio-economic systems that promote equity, social inclusion, reciprocity and mutual responsibility; and political systems that are more participative, responsive, preventive, non-elitist and egalitarian. [ . . . ] Synergy is a principle for development of creative learning, self-organization, strategic thinking and shared intelligence, which can be applied to economic, social, cultural, ecological and political systems” [32].

CE is not only a way to reduce resource consumption and enhance industrial productivity through materials reuse, but is the only possible development model to decouple growth from resources constraints. It has three main characteristics:

1. It is oriented to enlarge the lifetime of goods, assigning them new functions from a long-time perspective;
2. It is based on synergies and symbioses between actors in fostering closed loops of value creation: economic wealth is created through multiplying of relationships;
3. It enhances productivity, decoupling wealth production from negative environmental impacts [33].

It includes organizational models in the fields of bioeconomy, blue economy, green economy, sharing/collaborative economy, social/solidarity economy and civil economy [33]. A study of Ellen MacArthur Foundation points out that “for the European economy at large, the circular economy could produce better welfare, GDP, and employment outcomes than the current development path” [30]. A recent study by the Club of Rome estimated the additional employment expected from a transition to the circular economy would vary between 300,000 and more than one million in five European countries [28].

The circular economy can generate economic benefits in terms of increase of productivity, social benefits in terms of employment and minor costs of access to goods, also thanks to social enterprise and ecological benefits in terms of reduction of greenhouse emissions and resource consumption.

CE is based on nine principles (the 9R’s): Refuse, Rethink, Reduce, Reuse, Repair, Refurbish, Remanufacture, Repurpose, Recycle, Recover [34]. The Ellen MacArthur Foundation has identified a strategic framework of actions to implement the CE: Regenerate, Share, Optimize, Loop, Virtualize, Exchange (ReSOLVE) [35]. The Habitat III New Urban Agenda (NUA) [36], par. 71–74, introduces the notion of circular economy not only for managing waste, but also as a new development model, that incorporates external effects on natural and social context while generating new economic wealth; that opens the economy in a multidimensional space, introducing a complex notion of value (complex social, economic, environmental value); that stimulates an indefinite enlargement of the lifetime of resources; that promotes circuits of cooperation between different actors for producing economic wealth, re-localizing economies.

The circular economy has been recently applied at the spatial scale of cities and regions [37–39]. Scientific studies have attempted to identify the key features, criteria and indicators for circular city-region representation and performance assessment [40–43]. However, there is still a knowledge gap regarding whether and how cultural landscape can represent an important element for circular city-region implementation [42–45].

Furthermore, the circular economy is not only limited to specific economic, environmental and social impacts, but offers a “new cultural horizon”. As stated by Luigi Fusco Girard, “the circular economy is grounded in the culture of cooperation, and thus on reciprocal trust”, suggesting that “smart specialisation of the rural heritage should be interpreted through the perspective of the circular economy, offering a culture of collaboration, synergies and integration” [46], aiming to re-generate through actions the diverse forms of capital: man-made, natural, social, human, financial [26].

Therefore, according to the main studies linking circular economy to heritage-led/landscape-led territorial regeneration [26,42–44,47–50], the objectives of a circular economy in cities and regions can be synthesized as follows:

- Reducing wastes of energy, freshwater, materials, and fertile soils (soil consumption);
- Reducing greenhouse gas emissions accounted within the life-cycle of production and consumption processes;
- Halt and reverse biodiversity loss enhancing nature regeneration;
- Enhancing cooperation, symbioses and synergies at territorial level, as well as civic responsibility towards natural and cultural resources depletion for present and future generations;
- Decoupling economic growth from resources consumption, increasing jobs and growth in the longer-term horizon;
- Enhancing health and wellbeing of people and local communities;
- Promote beauty as a fundamental aspect of human wellbeing and an indicator of nature and peoples’ health and flourishing, promoting nature regeneration and cultural diversity and identity.

Terraced landscape regeneration can contribute to the achievement of circular city-region objectives, taking into account the complex multidimensional values that they express.

## 2.2. The “Complex” Value of Terraced Landscapes

The European Landscape Convention (ELC) [51] acknowledges that quality and diversity of landscapes constitute a common resource, to achieve sustainable development based on a balanced and harmonious relationship between social needs, economic activity and the environment.

Changes in agricultural practice, depopulation and marginalization, and short-term management decisions at the local level, have all contributed to unemployment, poverty and a loss of biodiversity and cultural diversity. Nonetheless, cultural landscapes are considered strategic resources for sustainable development.

The concept of landscape is a key concept that has a central role due to its complexity and semantic richness [52]. Geographic literature has accompanied the conceptual evolution of this term from the original romantic sense to the deterministic scientific meaning (landscape as synonymous of nature and environment), hereafter to the historical approach (landscape as cultural heritage, product of different civilizations), to reach the most recent social meanings in which the term is strictly linked with the concepts of “territory” and “place”, enriching with social and cultural values linked to the identity and perception of populations. The ELC indeed defines the landscape as “an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors”, emphasizing the awareness and active role of the population in the perception and definition of landscapes qualities and characters. The ELC assumes that landscape is:

- (a) a polysemous concept containing multiple values and applied to the whole territory, not only to places of exceptional beauty, but also to ordinary or neglected places as the abandoned terraces;



- (b) a place of mediation between different perceptions, aims and points of view; it underlines the need for a point of convergence in recognizing landscapes as a source of wellbeing and identity for the inhabitants.

These two premises evoke the need to manage landscape in interdisciplinary and inclusive ways, freeing them from the exclusively restrictive and top-down approaches that often characterized landscape policies in the last decades of the twentieth century, integrating local knowledge and addressing stakeholders' needs to achieve more inclusive, cost-effective policies for landscape regeneration [1,53,54].

Landscape therefore rescues the land as a common good [55] and as a mediation tool [56,57] between different instances and points of view, to create a sort of meeting place that should guide the development of the territory adopting intrinsically multifunctional, sustainable and socially inclusive strategies.

According to the Millennium Ecosystems Assessment, ecosystems have a "Total Economic Value" (TEV) [58–60] related to the benefits that people derive from ecosystems. TEV includes a direct and indirect "use value" and an "independent-of-use value" that is identified in the "option value", "bequest value" and "existence value". However, not only ecosystems but also cultural landscapes have a particular value that originates in the complex mix of ecological, economic, social and cultural functions that support local communities living and wellbeing [2,61].

Since they are cultural landscapes, it is possible to identify a specific value of terraced landscapes related to contemporary functions: quality and beauty of landscape; environmental sustainability; agrobiodiversity opposed to extreme industrialization and re-naturalization processes; identity; ethical and social economy; rural-urban "pact" [62].

Terraced landscapes, with their dry-stone wall structures, are still a fundamental infrastructure for the stability of slopes. Climate change, related to the greater and greater frequency of high-intensity rainfall concentrated in few hours, is rapidly and severely increasing risks and threats in terraced mountain areas, more vulnerable due to their structural features. Complex terraced agricultural systems, including dry-stone walls structures and drainage systems, can be seen as a key infrastructure providing multiple ecosystem functions and services to local communities, which are peculiar, even if not yet fully accounted for [63–72].

Moreover, it is possible to identify an "intrinsic" value of cultural landscapes, that is linked to their centuries-long, life-supporting ecological functions and to their "circular" organization [43,63]. This value originates in the past but today represents a strong bridge to future circular organizational models in cities and regions. The next section presents the results of the conceptualization of the circular terraced landscape regeneration framework, identifying assessment criteria and exploring current practices to define a circular model of terraced landscapes regeneration.

### 3. Results: Terraced Landscapes as Expression of the Circular Economy Model

Circularization principles and models are gaining increasing attention [38,73–76], and potentially apply to different sectors related to rural regeneration [46]. Cultural and natural heritage of terraced landscapes can be a powerful economic, social and environmental catalyst for regeneration, sustainable development, economic growth and improvement of people's wellbeing and living environments, if circular processes are activated, enhancing rural landscapes productivity in a multidimensional perspective, creating "shared value" for all territorial actors [33].

Terraced landscapes could represent a centuries-long expression for new circular economies. Stone works, such as traditional buildings, dry stone walls and water collection and storage systems had an important role in contributing to landscapes multifunctionality: at the same time, these works supported agriculture and regulated water drainage, ensured the stability of slopes and offered a shelter for the inhabitants [17]. Traditional stone work in rural landscapes contributes to the beauty of landscapes and to their cultural diversity and identity [63]. This feature has been recognized by UNESCO in 2018 through the inscription

of “The art of dry-stone walling” in the “Representative List of the Intangible Cultural Heritage of Humanity”, opening-up a potential for linking cultural and natural heritage as key resources for local sustainable development, particularly in mountain areas:

*“The art of dry stone is the know-how of making utilitarian stone constructions without the use of any kind of binding material; in other words, stone is placed upon stone (stacking) and no other material is used except, sometimes, dry soil. [ . . . ] Dry stone constructions are inextricably linked with the sustainable organization of rural space. They are invaluable in: preventing landslides, floods and avalanches; combating erosion and desertification of the land; retaining water; enhancing biodiversity; creating adequate microclimatic conditions for agriculture. [Dry stone walls] constitute a tangible testimony of the methods and practices people have been using –from prehistory until today– to organise their living and working space by optimising natural and human local resources (landscape, available materials, soil properties, skills and labour). This type of construction has served as a basic condition of survival and still does. Dry stone technique has also been acknowledged and accordingly exploited by contemporary artists” [77].*

However, the knowledge and traditional skills of dry-stone wall making and sustainable land management are getting lost since very few older people still keep this knowledge.

According to the conceptualization of circular economy and terraced landscapes’ complex value as expressed in previous section, the circular terraced landscape regeneration framework can be implemented in terraced landscapes through specific actions:

- Enhancement of efficient closed water cycles recovering ancient water systems with channels and cisterns;
- Reuse of local stones and enhancement of traditional skills of “dry-stone walls making” (recently recognized by UNESCO as intangible heritage of Outstanding Universal Value);
- Valorization of the ecological function of dry stone walls that make terraced landscapes (non-intensive) a natural and cultural heritage; the Honghe Declaration defines terraced landscapes as “agri-cultural and ecological systems” able to preserve the world’s biodiversity and cultural diversity (Honghe Declaration, 2010) [78];
- Enhancement of social and cooperative dimension of terraced systems;
- Quality food production: locally based and sustainable agri-food networks, conservation of local cultivar (agro-biodiversity);
- Enhancement of rural “circular” tourism/hospitality.

While abandonment processes are increasing, due to multiple factors such as socio-economic changes, migrations to urban areas and increasing costs of labor, terraced landscapes continue to represent an outstanding example of circular territorial organization from many points of view [1,63]. They could be valorized as a contribution to the implementation of circular economies in cities and regions, enhancing systemic innovation—technological and social innovation grounded in traditional knowledge, new forms of sharing/collaborative/social and solidarity economy—to answer emerging contemporary needs. A new “urban-rural” pact could also be effectively implemented in the context of the COVID-19 pandemic, which shifted the attention from the center to the periphery, thanks to ICT technologies [45,79–81].

Innovative uses of terraced areas can provide diverse services to local communities, supporting safety, health, jobs and long-term sustainable economic growth. The convenience of reusing/regenerating terraced landscapes is linked to a multidimensional productivity enhanced by circular economy, reducing costs, wastes and risks, and enhancing benefits through sustainable productivity, risk sharing and co-investing, new revenue models linked to contemporary/innovative uses, avoidance of externalities as additional “savings” for the society. New evaluation tools are needed to identify the net impacts of terraced landscapes reuse and regeneration, taking into account (at least) the following criteria of impact:

- Economic impacts (productive, re-creative and educational uses of terraces)
- Environmental impacts (e.g., reduction of hydrogeological risks, water recovery, regeneration and reuse, agro-biodiversity preservation)
- Impacts on landscape quality
- Contribution to health and wellbeing of local communities
- Social-relational-common goods.

The following section presents a theoretical framework of terraced landscape reuse/ regeneration from the perspective of the circular economy, identifying five circularity drivers and a set of practical experiences that show how circularity can be implemented in diverse contexts and by various territorial actors, building a generally applicable and transferable model of “circular” reuse and regeneration of terraces addressed to policy makers.

### *3.1. Five Criteria for the Circular Reuse/Regeneration of Abandoned Terraced Landscapes*

According to the conceptual framework described, we could identify five drivers in terraced landscapes circular regeneration:

- Natural resources
- Food
- Knowledge and skills
- (Beyond) Tourism
- Urban-rural policies

#### 3.1.1. Natural Resources Circularity

Circularization of natural resources (water, soil and stones) is embedded in terraced landscapes structure. Terraces are not only cultivated lands, but complex slope infrastructures and hydraulic systems; they are often related to water collecting and drainage elements (cisterns, wells, dry-stone walls and channels inserted in a collective management), and function as mitigating agents in the case of intense and exceptional meteoric events, more and more frequent in areas affected by global warming; their construction contributes to the creation and conservation of fertile soils, a particularly important resource in those areas characterized by aridity and increasing desertification processes; finally, traditional building techniques favor the use of local raw material (dry stones) used in masonry walls without the use of exogenous materials with strong environmental impact (cement) and without waste of material.

#### 3.1.2. Food Circularity

Circularization in the food and agrobiodiversity sector can be driven through re-localization of agricultural production and consumption. Local agricultural products represent a tangible and intangible heritage that has contributed over centuries to the formation of traditional agrarian landscapes, conservation of clean water and soil fertility, and thus to the enhancement of the wellbeing of communities. Socio-cultural systems and associated traditional knowledge are forces that have, over centuries, shaped and formed unique biodiversity rich landscapes adapted to various geographical and sociocultural backgrounds around the world. Many EU studies and initiatives such as Food2030, Short Food Supply Chains and Local Food Systems in EU, and the Bioeconomy Report 2016, as well as the FAO initiative on City-Region Food Systems, stress the circular dimension in food production-consumption patterns and the convenience of enhancing short loops at the local/territorial/urban-rural levels. In recent years, new approaches have been experimented with for enhancing the heritage dimension in traditional food production-consumption systems: from Participatory Guarantee Systems in Greece, to Biocultural Heritage branding in Peru, to short food supply chains involving Solidarity Purchase Groups in Italy, up to circular innovations for local consumption and to avoid food waste [82].



### 3.1.3. Knowledge and Skills Circularity

Circularization in the knowledge sector is particularly related to traditional skills and local knowledge valorization. New circular models can be implemented, integrating in a systemic way the scientific knowledge and the practical, millennial “local traditional knowledge”, involving academic and practice partners (farmers, SMEs, NGOs, social businesses . . . ) in a process of co-learning and cross-fertilization. It relates to virtuous circularity between the so-called “ivory tower” and the society, and concerns not only technological transfer and the creation of innovations interlinked with social demand, but also the production and management of common goods. The New Urban Agenda [36], adopted by UN Member States in Quito, Ecuador, in October 2016 suggests a series of actions to achieve sustainable development in the concrete space of urban-rural territory. The founding agreement “Milan Urban Food Policy Pact”, stated in 2015 within Expo, launched an international protocol aimed at tackling food-related issues at the urban level [83]. Moreover, RUAFA is a “Global Partnership on Sustainable Urban Agriculture and Food Systems” that brings together cities, research institutes and civil society organizations with a recognized track record in urban and peri-urban agriculture and urban food systems [84]. In line with these initiatives, the New Urban Agenda introduces the idea of civic responsibility (par 156), after emphasizing the central role of culture (par 124). As a “laboratory of civil aesthetic” [85], this approach can see cultural landscapes as place of synergy between artists, architects, farmers, enterprises, third sector associations, financing bodies and institutions with the objective of producing both aesthetic and social values, considering the threefold function (ecological, productive, aesthetic) of Nature in urban ruralities [86].

### 3.1.4. (Beyond) Tourism Circularity

Circularization between urban and rural areas can be implemented especially in the recent context of the COVID-19 pandemic. Despite the dramatic halt of tourism activities in the last year due to the COVID-19 outbreak, tourism attractiveness remains one of the most powerful economic resources of Europe, thanks to the outstanding “beauty” created over centuries in European landscapes. The preservation of this beauty is strictly interrelated to its multifunctionality (ecological, social, economic, cultural functions put together to create landscape “beauty”) and can be strengthened through innovative and “responsible” tourism activities. Potential negative impacts of tourism are still less explored as a threat to local communities. Tourism development can become a serious threat to the availability of natural resources (such as freshwater) and the authenticity and integrity of a cultural heritage site, with rapid changes in local economies which turn from being based on traditional craft and food productions and lifestyles to “tourism-based” highly volatile economies. Traditional economic and social relationships that represent the “glue values” of communities risk disappearing in tourism-oriented territories, with tangible impacts especially on traditionally managed cultural landscapes that become more and more fragmented and abandoned. More attractive economic activities/options linked to the rise of tourism move farmers away from the land, as happened in the terraced landscapes of the Cinque Terre Park invaded by tourists. Circularity in terraced areas is related to heritage-led sustainable/responsible tourism approaches that can be developed considering the emerging sharing economy and the solidarity/civil economy based on reciprocity, mutuality and development of more “authentic” tourism experience and enriched relationships between tourists and the local “heritage” community (Faro Convention, 2005) [87].

### 3.1.5. Urban-Rural Policies Circularity

Circularization can be driven by regeneration of relationships in the rural-urban territorial system. As highlighted, urban and rural areas are mutually interdependent: rural villages and cities/metropolitan areas are two ends of a human settlements continuum [79]. Today, more than 50 percent of the world’s population lives in urban areas, and it is

estimated that this figure will rise to 66 percent by 2050 [88]. At the international level, the FAO initiative on “City-Region Food System” represents a proposal for tackling the urban-rural divide, with particular emphasis on food-related aspects of integrated urban-rural territories, while considering a combination of rural and urban settings for residency and work [80,89]. Peripheral and mountain areas are emerging as suitable places for living, studying and working [90–94], supported by ICT technologies and a reorganization of work and skills in all sectors [95]. This ongoing shift from mono-functional spaces and life timing to hybrid work-life structures favors forms of temporary or quasi-temporary residency, between residential and touristic territorial functions. This means that living structures are changing rapidly, towards a polytopic model [94], while the boundaries between “users” and “providers” are becoming more and more subtle, towards the hybrid figure of the “prosumer”, co-creating and co-using services and products.

Rural-urban partnerships are at the origin of a great part of terraced landscapes: this relationship can be newly explored, aiming at balanced development by bringing “economically strong and weak places together” [96]. New governance arrangements based on partnerships for urban-rural linkages have been analyzed by OECD [97], highlighting the opportunities of setting urban-rural functional areas and explicit partnerships for their sustainable development. OECD points out that the financial challenge of local governments to ensure access to services and quality of life in areas with lower growth rates has to be addressed. The URBACT study carried out by Pascariu and Czischke [81] has explored the spatial implications of urban-rural linkages, highlighting that proximity is a critical factor influencing the urban-rural relationships. From this perspective, innovative policies and economic tools based on ecosystem services assessment can be implemented, to recognize the multidimensional benefits of terraced landscapes regeneration and identify transparent and shared tools to acknowledge the stewardship role of local communities towards cultural landscape and life-supporting environmental resources [63,98].

### *3.2. Current Practices of Terraced Landscape Regeneration: Which Models of Circularity?*

According to the drivers of circularity identified, terraced landscape regeneration practices were explored, highlighting whether and how circular principles are implemented. As the circular economy applied to cultural heritage and landscape is a relatively recent concept, as highlighted in previous sections, the practices analyzed did not always include an explicit reference to circularity in their objectives, vision and organization. However, clear elements expressing circularity could be observed, which could support the search of a circular model to be generalized to other terraced and rural cultural landscapes. Also, some “borderline” practices were identified, which represent potential threats for terraces regeneration from a circular perspective.

The set of practices was selected based on the repository of terraced landscape regeneration experiences collected through the four World Congresses on Terraced landscapes, held in the period between 2010–2019. The International Terraced Landscape Alliance was directly involved in the organization of the international meetings hosting participants from all continents, representing diverse stakeholders from farmers to policy-makers, craftsmen, activists, researchers and students. After the first meeting held in China in 2010, which gave light to the Honge Declaration on protection and development of terraces [78], the second meeting was held in Peru, focusing on the role of local farmers for cultural and bio-diversity. The third meeting was hosted by the University of Padova in 2016 and involved ten local venues in Italy, while in 2019 it was organized at the Canary Islands, involving fieldtrips to diverse terraced areas. Through the world meetings, as well as previous research projects, a research and practice community was built, which was the source of the information reported in this study. For each practice selected, an initial desk analysis was conducted. In a second stage, interviews with local leaders and managers, as well as fieldtrips were also conducted to complement and deepen the knowledge of the practices. A synthetic overview of the experiences is presented in this paper, highlighting the most relevant circularity aspects.

### 3.2.1. Natural Resources Circularity: Provide Access to Abandoned Land for Out-Insiders

The association “Adotta un terrazzamento in Canale di Brenta” [Adopt a Terrace in the Brenta Valley]” was founded in Valstagna in 2010 by the University of Padua, the Municipality of Valstagna and the Italian Alpine Club. It has been working as an intermediary between the landowners of abandoned terraced fields, widely present on the slopes of the valley, and the people from the neighboring urban areas interested in taking care of their maintenance and cultivation. The abandoned plots are entrusted to the association through a contract of “free loan”; the association manage and supervise the restoration of the fields, giving them to new users who become its members. In this way from 2010 to 2020 the association has achieved the restoration of over 120 terraced fields on more than five hectares. Over 100 members from urban areas have joined, from near and distant towns, who cultivate the terraces and frequent the rural areas once at risk of abandonment. At the same time, the association has developed a communication and awareness raising activity concerning the abandonment of cultural landscapes, including an award-winning documentary [99] and an international networking activity (participation to ITLA World Meetings in Peru and Italy, 2014 and 2016). Natural resources protection was the topic of an artistic installation through terraces named “Coltiva l’arte”, a temporary project which then became a permanent exhibition attracting visitors and contributing to raising awareness on terrace regeneration. The initiative of the association further developed as a startup idea, selected between the most innovative solutions for cultural heritage and landscape regeneration from the perspective of the circular economy within the Horizon 2020 CLIC project [100]. The circular business model of the startup was based on a teaching farm, in which “people will understand the importance of old techniques of agriculture as well as of dry stone craft. Old knowledge will interact with new understandings thanks to the collaboration with students of agriculture”.

This example contrasts with the widespread abandonment of terraced fields and soils generated by land pulverization that affects a large part of the terraced land in areas of strong emigration, not only in the Italian mountains but also in Croatian and Greek small islands, or in the Cinque Terre (Liguria), where the landslides in the recent floods of 2010 and 2011 affected the most recently abandoned terraces.

### 3.2.2. Food Circularity: Agrobiodiversity Conservation and Enhancement

An interesting example of conservation of agrobiodiversity and enhancement of local products is The Potato Park (Pisac Valley, Cusco, Peru) managed by the ANDES association, a terraced landscape where dry-stone terraces are home to eight known native and cultivated species and 1375 varieties of potatoes. The Potato Park’s mission is to restore the genetic diversity of the native potato and promote its conservation and sustainable use, linking it to landscape heritage. The Park has developed Local Biocultural Databases, to conserve, promote and protect local knowledge; this tool includes audiovisual information, matrices of biodiversity, Geographic Information Systems (GIS) and free software. The database also provides the basis for land use planning, with the purpose of protecting agro-biodiversity and traditional landscape practices. Another goal of the Potato Park has been to define an alternative development model, establishing several economic groups with the objective of sustainably using biological resources and achieving a solid economy.

Another interesting initiative was developed in the Amalfi Coast, Southern Italy, a terraced area known for its dramatic landscape, included in the UNESCO List of World Heritage. A crowdfunding campaign was developed to recover the autochthonous seeds of a special variety of tomato (*Fiascone*), resulting in a first experimental production and the launch of an agro-business startup for its commercialization [63]. The startup grew in the last years, becoming a reference business for almost 15 local farmers and households that joined the tomato production, recovering abandoned terraces. The startup currently sustains and supports the still existing local traditions and economy, enhancing the agriculturally shaped territory of the Amalfi Coast that offers a big variety of seeds and eno-gastronomical heritage—based on families who cultivated the terraced landscape

since centuries, offering the connection to an international market of high-quality products. Recently, this startup was selected as one of the 15 best ideas/solutions within the Horizon 2020 CLIC startup competition, aimed at supporting and awarding the best business ideas and startups in the field of cultural heritage and landscape reuse inspired to the circular economy [100].

These examples contrast with the intensive use of terraces for viticulture which often generates ecological damage with herbicides, antiseptics and destruction of the terraced structure for mechanization needs (such as occurs in Italy in the Prosecco hills near Treviso) [101].

### 3.2.3. Knowledge and Skills Circularity: Professionalization of Traditional Techniques

The association “Artisans Bâisseurs en Pierres Sèches” (ABPS) has been working with professionals, institutional and elected representatives, regional and national parks, scientists and other partners since 2002 to develop and structure a professional dry stone walling network in France. In 2006, ABPS created the first French professional dry stone walling school (national and international itinerant training on partner sites, opening of a permanent centre at l’Espinass in the Cévennes in 2015) and works toward training and qualifying artisans, developing professional guidelines, benchmark documents and specialized courses for professional builders and a larger public (farmers, municipal workers, trainers, architects, landscape gardeners, jobseekers).

This example contrasts with improper interventions of restoration of walls with the use of reinforced concrete walls, use of waterproof binder among the stones in order to guarantee the tightness of the walls for mechanization needs, which occur in many agribusiness areas, as well as in the areas recognized as historical rural landscapes as Valle di Cembra in Trentino, by workers who have lost their technical knowledge of dry stone walling.

ITLA (International Terraced Landscape Alliance), particularly with the Italian section, has tackled this urgent issue promoting the development of a national coordination among local schools for dry-stone walls recovery, based on the best practice of the French ABPS school (Artisans Bâisseurs en Pierre Seche). In recent years, thanks to the activity of ITLA at the global and national level, training courses and educational activities have been launched to recover the skills and knowledge of dry-stone wall making.

### 3.2.4. (Beyond) Tourism Circularity: Hospitality in Traditional Villages

The Laona Foundation, in Cyprus, is a private non-profit organization that was established to implement a rural regeneration and ecotourism project in a terraced landscape area which was completed in 1994. The project involved five villages on the border of the proposed Akamas reserve area and helped introduce the concept of agrotourism to Cyprus through the project’s activities. A total of 26 traditional buildings were restored, infopoints were developed in each village and a number of publications were produced. Since 1994, the Laona Foundation has continued its activities, offering guidance to the local people; in the same time, at the request of other communities outside Laona, it has broadened the scope of its activities to cover all areas of Cyprus and offered guidance to interested parties from Crete and Nepal. Since 2003, it has been taking an increasing interest in issues of landscape and participates as an observer in the meetings of the Landscape Convention, Council of Europe. With assistance from Laona, a number of restored houses in the five project villages have been promoted for rental by holiday-makers.

This example contrasts with new tourist buildings that are placed side by side with abandoned rural houses, increasing the consumption of soil and the impermeable surface, for example in the Ligurian Riviera, and sometimes in contexts of illegal building, such as on the Amalfi Coast (see the case study of Fuenti, cited in Erbani, 2019) [102].

### 3.2.5. Urban-Rural Policies Circularity: Multi-Actor and Multi-Scale Approaches at Regional Level

An example of cooperation for terrace recovery at regional level is the The “Parque Natural de la Sierra de Espadán” in the area of Valencia, Spain. Here, coordinated policies for protection from environmental risks are linked to local agriculture development, through a multifunctional and multiscale approach. The “Parque Natural de la Sierra de Espadán” covers an area of 31,180 hectares, with exceptional landscape value and botanical and fauna richness, evident in the great number of endemisms and singularities in its territory (including cork forest). The Park comprises 19 municipalities, most of them highly affected by agricultural abandonment that resulted in the spontaneous revegetation of the mountain slopes, previously terraced. This revegetation has severely increased the risk of forest fires and impedes the access of firefighting equipment (as the ancient roads are not well maintained). Being aware of these problems, activities in cooperation and field work and University of Valencia researchers have developed methodologies to assist the local and regional actors to prevent these risks, developing the role of stone terraced fields as “islands” where the forest fire decrease their intensity and speed of propagation, protecting the neighboring areas and settlements.

The initiative on “Adopt a terrace” also presents characteristics of the urban-rural policies circularity, as it involves public, private and third sector actors in an effective cooperation approach for the regeneration of terraces. The agreement signed by the Municipality of Valstagna, the University of Padova, the Association Adopt a Terrace and the national association CAI for the valorization of mountain landscapes is an example of circular cooperation, defining a “win-win-win” approach to landscape regeneration.

This example contrasts with the increase in the risk of fires that is affecting southern Italy, not only as consequence of the climate change (increase of temperatures and frequency of periods of drought), but also of the abandonment of land and the regrowth of spontaneous vegetation which determines an increase in the speed and extent of arson in neglected areas.

### 3.3. Towards a Circular Model of Terraced/Cultural Landscape Regeneration

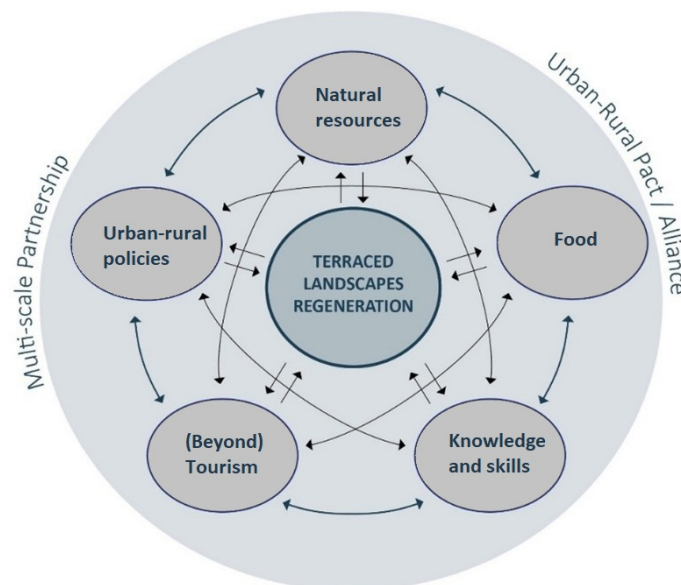
The experiences described expressed diverse aspects of circularity implementation through terraced landscape regeneration and recovery. Examples of “threats” for circular regeneration were also identified, to provide additional elements for deeper understanding of circularity principles and drivers. The re-generative nature of circular economy is here stressed, touching all “capitals” of rural landscapes [26]: the built capital (man-made) of dry-stone walls as elements of protection from natural risks and biodiversity enhancement, the natural capital of both wildlife and agro-biodiversity, the cultural capital of landscape and identity, the social capital of relationships and mutual cooperation approaches, contributing to wellbeing and health of communities, and finally the financial capital, through self-sustainable economic models that can potentially become independent from public sector support, through cost reduction and synergy generation.

Table 1 shows circularity criteria in relation to the practices selected, focusing on innovation areas/solutions that support the circular model of terraced landscape regeneration (Figure 2), as well as potential threats linked to “linear” approaches still visible in diverse cultural landscapes.



**Table 1.** Overview of circularity drivers and related practices, circular innovation areas/solutions and threats.

Circularity Drivers	Practices	Circular Innovation Areas/Solutions	Potential Threats
Natural resources circularity	Adopt a terrace (IT)	Access to abandoned terraced areas	Land ownership fragmentation
Food circularity	Parque de la Papa (PE), Effetto Costiera (IT)	Agrobiodiversity conservation and enhancement	Intensive use of terraces for viticulture; use of herbicides and antiseptics; destruction of the terraced structure for mechanization agriculture needs
Knowledge and skills circularity	Artisans Bâtisseurs en Pierres Sèches (FR), ITLA network (IT)	Professionalization of traditional techniques	Improper restoration interventions on dry-stone walls with the use of reinforced concrete; use of waterproof binder among the stones for mechanization needs
(Beyond) Tourism circularity	Laona Foundation (CY)	Hospitality in traditional villages	Building construction speculation fostered by attractive landscape, increasing soil consumption and impermeable surfaces; illegal building construction
Urban-rural policies circularity	Parque Natural Sierra de Espadán (ES)	Protection against environmental risks	Abandonment of terraced land and regrowth of spontaneous vegetation; increase in the risk of fires and hydrogeological risks

**Figure 2.** Five drivers of circularity in terraced landscapes regeneration.

#### 4. Conclusions

In recent years, there has been sporadic but widespread return and repopulation phenomena in abandoned mountain areas by amenity migrants and people now recognize the multiplicity and depth of forgotten ecological, cultural and food variety values [2,90,91,103]. To transform marginal mountain areas into a laboratory for a new paradigm that combines tradition and innovation, green and blue economies, heritage and new technologies, and both the first and third wave [104], local bottom-up actions and new governance measures are needed to enhance systemic cooperation between research actors, institutional actors and business and community actors, thus supporting the knowledge economy, knowledge society and knowledge democracy, and socio-ecological transition in rural landscapes.

The current practices of terraced landscape reuse and regeneration presented in this paper showed how it is possible to activate circularization processes, enhancing “virtuous loops” of value creation at the local level. It was shown that terraced landscapes have the potential to produce wealth both directly, through use values, which meet demand and supply, and indirectly, through relational values that form the foundation of symbiotic processes and, in turn, generate added economic, social and environmental values, if integrated in territorial development strategies. All of them show that the heritage value of these areas can be an enabler of innovation, creative thinking and socially responsible behaviors, including consumer (or beneficiaries) behaviors that support circular economy through the creation/enhancement of a specific demand of sustainable goods and services.

This study also aims to contribute to a structured database of terraced landscape regeneration practices, as sustainable initiatives able to contribute to the circular economy implementation at the territorial level.

In the framework of the UN-Agenda 2030, the regeneration of cultural landscape is central. Cultural and natural heritage is explicitly mentioned in Goal 11—*Make cities and human settlements inclusive, safe, resilient and sustainable* (Target 11.4—*Strengthen efforts to protect and safeguard the world’s cultural and natural heritage*). However, culture, cultural heritage and landscape is important in the achievement of other goals: culture is a fundamental element of every project or plan of transformation.

Heritage-led rural regeneration contributes to the achievement of many SDGs: Goal 1—*End poverty in all its forms everywhere*—by contributing to local economies and equal access to resources; Goal 2—*End hunger, achieve food security and improved nutrition and promote sustainable agriculture*—by maintaining traditional agrarian landscapes that enhance ecosystem services, conserving the associated traditional knowledge; Goal 3—*Ensure healthy lives and promote wellbeing for all at all ages*—since cultural landscape is a fundamental element of wellbeing; Goal 4—*Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all*—by contributing to the appreciation of cultural diversity and of culture’s contribution to sustainable development; Goal 8—*Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all*—cultural heritage enhances creativity and innovation and contributes to sustainable tourism in rural areas that creates long-term jobs and promotes local culture and products; Goal 9—*Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation*—conservation and reuse of cultural heritage and landscape contributes to resource-use efficiency and reduction of CO<sub>2</sub> emissions in the perspective of the circular economy; Goal 12—*Ensure sustainable consumption and production patterns*—conservation and reuse of cultural heritage and landscape contributes to the efficient use of natural resources reducing material footprint and domestic material consumption, and reducing waste from the construction industry in the perspective of the circular economy; Goal 15—*Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and biodiversity loss*—traditional agrarian landscapes contribute to combat desertification and land degradation, and help reduce the loss of biodiversity and the spread of invasive alien species.

Rural regeneration is gaining momentum worldwide as a major contribution to sustainable development, including city-region balanced development. Within the New Urban Agenda, a global partnership on Urban-Rural Linkages has been created [105]. In 2001, FAO launched a multidisciplinary initiative “Food for the Cities” aiming at addressing urbanization challenges of urban and rural population, as well as the environment, by building more sustainable and resilient food systems. This concept led to the idea of city region food systems (CRFS) [106]. Regarding the implementation of circular economy strategies at the territorial level, the first studies have been developed [38]. The *Pact of Amsterdam* has led to the creation of new European Partnerships within the Urban Agenda for the EU, one of which is the Partnership Circular Economy that published the Action Plan in February 2018.

This study highlighted that terraced landscapes can be enhanced through “circular” territorial regeneration approaches attracting new businesses, residents and investments, if their potential for innovative regeneration and reuse from a past-to-future perspective will be leveraged. Therefore, it is important to conserve and maintain terraced areas in use, integrating stakeholders and citizens in an active and inclusive framework for sustainable landscape management. The practices analyzed demonstrate that it is possible to learn from and hybridize local and specialized knowledge, enhancing the beauty, quality and multifunctionality of terraced landscapes as elements of attractiveness and safety for citizens, businesses and tourists.

Recovery and maintenance interventions in terraced mountain areas are extremely difficult to plan for public actors, even in case of availability of funding sources, due to the extreme fragmentation of land ownership. This issue hinders the possibility of implementing coordinated adaptation plans that need the collaboration of public and private actors. Public-private-people partnerships would enable cost and resource sharing for effective implementation of adaptation plans.

Careful evaluation of impacts of terraced landscape reuse/regeneration practices from a circular economy perspective should accompany policies and practices, focusing on environmental/ecological impacts of terraces reuse, cultural and social effects, especially considering potential and actual impacts on health and wellbeing. Multidimensional and multicriteria evaluation involving all stakeholders could indeed effectively stimulate creativity and innovation towards win-win-win circular solutions for longer-term sustainable development.

**Author Contributions:** Conceptualization, A.G. and M.V.; methodology, A.G. and M.V.; investigation, resources and data curation, A.G. and M.V.; writing—original draft preparation, A.G.; writing—review and editing, A.G. and M.V.; supervision, M.V.; project management and funding acquisition, A.G. Both authors have read and agreed to the published version of the manuscript.

**Funding:** This research has been co-developed under the framework of Horizon 2020 research project CLIC: Circular models Leveraging Investments in Cultural heritage adaptive reuse. This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No. 776758.

**Institutional Review Board Statement:** Not applicable.

**Informed Consent Statement:** Not applicable.

**Data Availability Statement:** Data sharing not applicable.

**Acknowledgments:** Many thanks to Lucija Azman Momirski, Sabina Asins Velis, Donatella Murtas, Luigi Fusco Girard, Luca Lodatti, Maria Angelica Salas, Timmi Tillmann, Carolin Callenius, Andrea Knierim, Theano Therkenli, Alexandra Kruse and other partners for the brainstorming and cooperative contribution within the H2020 Livingstones project proposal.

**Conflicts of Interest:** The authors declare no conflict of interest.

## References

1. Varotto, M.; Bonardi, L.; Tarolli, P. *World Terraced Landscapes. History, Environment, Quality of Life*; Springer: Berlin/Heidelberg, Germany, 2019; ISBN 3319968157.
2. Bonardi, L.; Varotto, M. *Paesaggi Terrazzati d’Italia*; Club Alpino Italiano-Franco Angeli: Milano, Italy, 2016.
3. Combining Agricultural biodiversity, Resilient Ecosystems, Traditional Farming Practices and Cultural Identity. Available online: <https://www.rederural.gov.pt/centro-de-recursos/send/2-agricultura-agroindustria/796-globally-important-agricultural-heritage-systems-combining-agricultural-biodiversity-resilient-ecosystems-traditional-farming-practices-and-cultural-identity> (accessed on 1 April 2021).
4. UNCCD. *Promotion of Traditional Knowledge: A compilation of UNCCD Documents and Reports from 1997–2003*; UNCCD: Bonn, Germany, 2005.
5. UNESCO WHC. World heritage agricultural landscapes. *World Herit.* **2013**, *69*, 6–13.
6. Tarolli, P.; Preti, F.; Romano, N. Terraced landscapes: From an old best practice to a potential hazard for soil degradation due to land abandonment. *Anthropocene* **2014**, *6*, 10–25. [CrossRef]
7. Grove, A.T.; Rackham, O. *The Nature of Mediterranean Europe: An Ecological History*; Yale University Press: London, UK, 2003.

8. Lasanta, T.; Arnáez, J.; Oserín, M.; Ortigosa, L.M. Marginal lands and erosion in terraced fields in the Mediterranean mountains: A case study in the Camero Viejo (Northwestern Iberian System, Spain). *Mt. Res. Dev.* **2001**, *21*, 69–76. [[CrossRef](#)]
9. Cammeraat, E.L.H. Scale dependent thresholds in hydrological and erosion response of a semi-arid catchment in southeast Spain. *Agric. Ecosyst. Environ.* **2004**, *104*, 317–332. [[CrossRef](#)]
10. Cots-Folch, R.; Martínez-Casasnovas, J.A.; Ramos, M.C. Land terracing for new vineyard plantations in the north-eastern Spanish Mediterranean region: Landscape effects of the EU Council Regulation policy for vineyards' restructuring. *Agric. Ecosyst. Environ.* **2006**, *115*, 88–96. [[CrossRef](#)]
11. Van Wesemael, B.; Poesen, J.; Sole Benet, A.; Cara Barrionuevo, L.; Puigdefábregas, J. Collection and storage of runoff from hillslopes in a semi-arid environment: Geomorphic and hydrologic aspects of the aljibe system in Almeria province, Spain. *J. Arid Environ.* **1998**, *40*, 1–14. [[CrossRef](#)]
12. Yuan, T.; Fengmin, L.; Puhai, L. Economic analysis of rainwater harvesting and irrigation methods, with an example from China. *Agric. Water Manag.* **2003**, *60*, 217–226. [[CrossRef](#)]
13. Gachene, C.K.K.; Mbuvi, J.P.; Jarvis, N.J.; Linner, H. Soil Erosion Effects on Soil Properties in a Highland Area of Central Kenya. *Soil Sci. Soc. Am. J.* **1997**, *61*, 559–564. [[CrossRef](#)]
14. Wakindiki, I.I.C.; Ben-Hur, M. Indigenous soil and water conservation techniques: Effects on runoff, erosion, and crop yields under semi-arid conditions. *Aust. J. Soil Res.* **2002**, *40*, 367–379. [[CrossRef](#)]
15. Louwagie, G.; Gay, S.H.; Sammeth, F.; Ratering, T. The potential of European Union policies to address soil degradation in agriculture. *L. Degrad. Dev.* **2011**, *22*, 5–17. [[CrossRef](#)]
16. Li, X.H.; Yang, J.; Zhao, C.Y.; Wang, B. Runoff and sediment from orchard terraces in southeastern China. *Land Degrad. Dev.* **2014**, *25*, 184–192. [[CrossRef](#)]
17. Tarolli, P.; Rizzo, D.; Brancucci, G. Terraced Landscapes: Land Abandonment, Soil Degradation, and Suitable Management. In *World Terraced Landscapes: History, Environment, Quality of Life*; Varotto, M., Bonardi, L., Tarolli, P., Eds.; Springer: Berlin/Heidelberg, Germany, 2019; pp. 195–210.
18. Wei, H.; Liu, H.; Xu, Z.; Ren, J.; Lu, N.; Fan, W.; Zhang, P.; Dong, X. Linking ecosystem services supply, social demand and human well-being in a typical mountain–oasis–desert area, Xinjiang, China. *Ecosyst. Serv.* **2018**, *31*, 44–57. [[CrossRef](#)]
19. Diaz-Varela, R.A.; Zarco-Tejada, P.J.; Angileri, V.; Loudjani, P. Automatic identification of agricultural terraces through object-oriented analysis of very high resolution DSMs and multispectral imagery obtained from an unmanned aerial vehicle. *J. Environ. Manag.* **2014**, *134*, 117–126. [[CrossRef](#)] [[PubMed](#)]
20. Pijl, A.; Barneveld, P.; Mauri, L.; Borsato, E.; Grigolato, S.; Tarolli, P. Impact of mechanisation on soil loss in terraced vineyard landscapes. *Geogr. Res. Lett.* **2019**, *45*, 287–308. [[CrossRef](#)]
21. Tarolli, P.; Straffellini, E. Agriculture in Hilly and Mountainous Landscapes: Threats, Monitoring and Sustainable Management. *Geogr. Sustain.* **2020**, *1*, 70–76. [[CrossRef](#)]
22. Fagarazzi, L.; Varotto, M. I terrazzamenti alpini come paesaggi intermedi tra volontà di recupero ed equilibri necessari: l'esperienza ALPTER. In Proceedings of the Atti del XII Convegno Nazionale Interdisciplinare IPSAPA "Volontà, Libertà e Necessità Nella Creazione del Mosaico Paesistico-Culturale"; Allegato n. 18 (2008) Della Rivista «Architettura del Paesaggio», Cividale del Friuli, Italy, 25–26 October 2007.
23. Varotto, M.; Ferrarese, F.; Pappalardo, S.E. Italian Terraced Landscapes: The Shapes and the Trends. In *World Terraced Landscapes: History, Environment, Quality of Life*; Varotto, M., Bonardi, L., Tarolli, P., Eds.; Springer: Berlin/Heidelberg, Germany, 2019; pp. 27–43.
24. Ferrarese, F.; Pappalardo, S.E.; Cosner, A.; Brugnaro, S.; Alum, K.; Dal Pozzo, A.; De Marchi, M. Mapping Agricultural Terraces in Italy. Methodologies Applied in the MAPTER Project. In *World Terraced Landscapes: History, Environment, Quality of Life*; Varotto, M., Bonardi, L., Tarolli, P., Eds.; Springer: Berlin/Heidelberg, Germany, 2019; pp. 179–194.
25. International Terraced Landscape Alliance. Manifesto Choosing the Future for Terraced Landscapes. Available online: <http://www.terracedlandscapes2016.it/temporary/wp-content/uploads/2016/11/01-Manifesto-Choosing-the-future-for-Terraced-Landscapes-Padova-15-oct-2016.pdf> (accessed on 1 April 2021).
26. Fusco Girard, L. The City and the Territory System: Towards The "New Humanism" Paradigm. *Agric. Agric. Sci. Procedia* **2016**, *8*, 542–551. [[CrossRef](#)]
27. Ellen MacArthur Foundation. *Towards the Circular Economy*; Ellen MacArthur Foundation: London, UK, 2013; Volume 1.
28. Wijkman, A.; Skånberg, K. The Circular Economy and Benefits for Society: Jobs and Climate Clear Winners in an Economy Based on Renewable Energy and Resource Efficiency. Available online: <https://www.clubofrome.org/publication/the-circular-economy-and-benefits-for-society/> (accessed on 30 January 2021).
29. CLIC Project Horizon 2020 CLIC Circular Models Leveraging Investments for Cultural Heritage Adaptive Reuse. Available online: [www.clicproject.eu](http://www.clicproject.eu) (accessed on 30 January 2021).
30. Ellen MacArthur Foundation. *Growth within: A Circular Economy Vision for a Competitive Europe*; Ellen MacArthur Foundation: London, UK, 2015.
31. Le Moigne, R. *L'économie Circulaire. Comment la Mettre en Œuvre dans l'entreprise Grâce à la Reverse Supply Chain?* Dunod: Malakoff, France, 2014.
32. Fusco Girard, L. Editorial. *BDC. Boll. Del Cent. Calza Bini* **2017**, *17*, 7–10. [[CrossRef](#)]



33. Fusco Girard, L.; Gravagnuolo, A. Circular economy and cultural heritage/landscape regeneration. Circular business, financing and governance models for a competitive Europe. *BDC. Boll. Del Cent. Calza Bini* **2017**, *17*, 35–52.
34. Kirchherr, J.; Reike, D.; Hekkert, M. Conceptualizing the circular economy: An analysis of 114 definitions. *Resour. Conserv. Recycl.* **2017**, *127*, 221–232. [[CrossRef](#)]
35. Ellen MacArthur Foundation. *Towards the Circular Economy: Accelerating the Scale-Up across Global Supply Chains*; Ellen MacArthur Foundation: London, UK, 2014.
36. United Nations. New Urban Agenda. In Proceedings of the United Nations Habitat III, Quito, Ecuador, 17–20 October 2016.
37. ESPON. *CIRCTER—Circular Economy and Territorial Consequences. Draft Synthesis Report*; ESPON: Brussels, Belgium, 2019.
38. ESPON; Interact; Interreg Europe; URBACT. *Pathways to a Circular Economy in Cities and Regions*; ESPON: Brussels, Belgium, 2016.
39. Ellen MacArthur Foundation; ARUP. *Circular Economy in Cities: Project Guide*; Ellen MacArthur Foundation: London, UK, 2019.
40. Prendeville, S.; Cherim, E.; Bocken, N.; Cherim, E.; Bocken, N. Circular Cities: Mapping Six Cities in Transition. *Environ. Innov. Soc. Transit.* **2018**, *26*, 171–194. [[CrossRef](#)]
41. Marin, J.; De Meulder, B. Interpreting circularity. Circular city representations concealing transition drivers. *Sustainability* **2018**, *10*, 1310. [[CrossRef](#)]
42. Gravagnuolo, A.; Angrisano, M.; Fusco Girard, L. Circular Economy Strategies in Eight Historic Port Cities: Criteria and Indicators towards a Circular City Assessment Framework. *Sustainability* **2019**, *11*, 3512. [[CrossRef](#)]
43. Fusco Girard, L.; Nocca, F.; Gravagnuolo, A. Matera: City of nature, city of culture, city of regeneration. Towards a landscape-based and culture-based urban circular economy. *Aestimum* **2019**, *74*, 5–42. [[CrossRef](#)]
44. Fusco Girard, L.; Nocca, F. Moving Towards the Circular Economy/City Model: Which Tools for Operationalizing This Model? *Sustainability* **2019**, *11*, 6253. [[CrossRef](#)]
45. Angrisano, M.; Biancamano, P.F.; Bosone, M.; Carone, P.; Daldanise, G.; De Rosa, F.; Franciosa, A.; Gravagnuolo, A.; Iodice, S.; Nocca, F.; et al. Towards operationalizing UNESCO Recommendations on “Historic Urban Landscape”: A position paper. *Aestimum* **2016**, 165–210. [[CrossRef](#)]
46. Garzillo, C.; Matei, A.; Xydia, S. *Cultural and Natural Heritage for Regional Smart Specialisation Strategies—Breakfast at Sustainability’s Report*; ICLEI: Freiburg, Germany, 2020.
47. Fusco Girard, L.; Nijkamp, P. *Energia, Bellezza, Partecipazione: La Sfida Della Sostenibilità. Valutazioni Integrate tra Conservazione e Sviluppo*; FrancoAngeli: Milano, Italy, 2004; ISBN 8846462521.
48. Fusco Girard, L. The regenerative city and wealth creation/conservation: The role of urban planning. *Int. J. Glob. Environ. Issues* **2014**, *13*, 118–140. [[CrossRef](#)]
49. Fusco Girard, L. Implementing the circular economy: The role of cultural heritage as the entry point. Which evaluation approaches? *BDC. Boll. Del Cent. Calza Bini* **2019**, *19*, 245–277. [[CrossRef](#)]
50. Fusco Girard, L.; Vecco, M. Genius Loci: The evaluation of places between instrumental and intrinsic values. *BDC. Boll. Del Cent. Calza Bini* **2019**, *19*, 473–495. [[CrossRef](#)]
51. Council of Europe. *European Landscape Convention*; European Treaty Series-No. 176; Council of Europe: Strasbourg, France, 2000.
52. Wylie, J. *Landscape*; Routledge: London, UK, 2007.
53. Agrawal, A.; Gibson, C.C. Enchantment and Disenchantment: The Role of Community in Natural Resource Conservation. *World Dev.* **1999**, *27*, 629–649. [[CrossRef](#)]
54. Ferrucci, N.; Brocca, M. *Il Paesaggio Agrario: Dal Vincolo alla Gestione Negoziata*; FrancoAngeli: Milano, Italy, 2019.
55. Olwig, K. The Landscape of ‘Customary’ Law versus that of ‘Natural’ Law. *Landsc. Res.* **2005**, *30*, 299–320. [[CrossRef](#)]
56. Joliveau, T.; Michelin, Y.; Ballester, P. Éléments et méthodes pour une médiation paysagère. In *Paysage et Information Géographique*; Brossard, T., Wieber, J.C., Eds.; Hermes: Paris, Italy, 2008; pp. 257–286.
57. Castiglioni, B.; Parascandolo, F.; Tanca, M. (Eds.) *Landscape as Mediator, Landscape as Commons. International Perspectives on Landscape Research*; Cleup: Padova, Italy, 2015.
58. MEA. *Ecosystems and Human Well-Being: A Framework for Assessment*; MEA: New Delhi, India, 2003.
59. TEEB. *The Economics of Ecosystems and Biodiversity Ecological and Economic Foundations*; Kumar, P., Ed.; Earthscan: London, UK; Washington, DC, USA, 2010.
60. TEEB. *TEEB for Agriculture & Food: An Interim Report*; UNEP: Geneva, Switzerland, 2015.
61. Gravagnuolo, A. *La Valutazione dei Paesaggi Culturali. Approcci e Strumenti per la Tutela e Valorizzazione dei Sistemi Terrazzati*; University of Naples: Naples, Italy, 2015.
62. Agnoletti, M. (Ed.) *Paesaggi Rurali Storici. Per un Catalogo Nazionale*; Laterza: Roma-Bari, Italy, 2010.
63. Fusco Girard, L.; Gravagnuolo, A.; De Rosa, F. The Multidimensional Benefits of Terraced Landscape Regeneration: An Economic Perspective and Beyond. In *World Terraced Landscapes. History, Environment, Quality of Life*; Varotto, M., Bonardi, L., Tarolli, P., Eds.; Springer: Berlin/Heidelberg, Germany, 2019; pp. 273–293.
64. Collier, M.J. Field Boundary Stone Walls as Exemplars of “Novel” Ecosystems. *Landsc. Res.* **2013**, *38*, 141–150. [[CrossRef](#)]
65. Darlington, A. *Ecology of Walls*; Heinemann Educational Books: London, UK, 1981.
66. Dry Stone Walling Association Dry Stone Walls and Wildlife. Available online: <https://www.dswa.org.uk/leaflets/> (accessed on 30 January 2021).
67. Franin, K.; Ivanov, K.; Marčelić, Š.; Kuštera Franin, G.; Kos, T. Mediterranean dry stone walls as elements of ecological infrastructure. *Landsc. Manag. Funct. Biodivers. IOBC-WPRS Bull.* **2019**, *143*, 75–78.



68. Košulič, O.; Michalko, R.; Hula, V. Recent artificial vineyard terraces as a refuge for rare and endangered spiders in a modern agricultural landscape. *Ecol. Eng.* **2014**, *68*, 133–142. [[CrossRef](#)]
69. Manenti, R. Dry stone walls favour biodiversity: A case-study from the Appennines. *Biodivers. Conserv.* **2014**, *23*, 1879–1893. [[CrossRef](#)]
70. Murtas, D. *Pietra su Pietra. Costruire, Mantenere, Recuperare i Muri in Pietra a Secco*; Pentàgora: Savona, Italy, 2015.
71. Powell, J.; Lake, J.; Gaskell, P.; Courtney, P.; Smith, K. *Developing an Ecosystems Approach—Dry Stone Walls*; Historic England: London, UK, 2018.
72. Powell, J.; Lake, J.; Berry, R.; Gaskell, P.; Courtney, P.; Smith, K. *Heritage, Natural Capital and Ecosystem Services—Historic Buildings and Their Associated Boundaries*; Historic England: London, UK, 2019.
73. European Commission. *Closing the Loop—An EU Action Plan for the Circular Economy*; European Commission: Brussels, Belgium, 2015; Volume 2.
74. European Commission. *Towards a Circular Economy: A Zero Waste Programme for Europe*; European Commission: Brussels, Belgium, 2014.
75. European Commission; Eco-Innovation Observatory. *Policies and Practices for Eco-Innovation Up-take and Circular Economy Transition. EIO bi-Annual Report*; European Commission: Brussels, Belgium, 2016.
76. European Commission. *Moving towards a Circular Economy with EMAS. Best Practices to Implement Circular Economy Strategies (with Case Study Examples)*; Publications Office of the European Union: Luxembourg, 2017.
77. UNESCO. *Art of Dry Stone Walling, Knowledge and Techniques. Nomination File No. 01393 for Inscription in 2018 on the Representative List of the Intangible Cultural Heritage of Humanity*; UNESCO: Paris, France, 2018.
78. ITLA. *Honghe Declaration—Global Declaration on Protection and Development of Terraces*; ITLA: Santiago De Los Caballeros, Dominican Republic, 2010.
79. UN-Habitat. *Habitat III Issue Papers 10—Urban-Rural Linkages*; UN-Habitat: New York, NY, USA, 2015.
80. Forster, T.; Santini, G.; Edwards, D.; Flanagan, K.; Taguchi, M. Strengthening Urban Rural Linkages through City Region Food Systems. *Reg. Dev. Dialogue* **2015**, *35*, 1–19.
81. Pascariu, S.; Czischke, D. *Promoting Urban-Rural Linkages in Small and Medium Sized Cities*; URBACT: Brussels, Belgium, 2015.
82. OECD. *The Circular Economy in Cities and Regions*; OECD: Paris, France, 2019.
83. Halliday, J.; Platenkamp, L.; Nicolarea, Y. *A Menu of Actions to Shape Urban Food Environments for Improved Nutrition*; GAIN, MUFPP and RUAF: Geneva, Switzerland, 2019.
84. RUAF Foundation. *Towards Sustainable and Resilient Urban Agriculture and Food Systems. Annual Report 2017–2018*; RUAF Foundation: Den Haag, The Netherlands, 2018.
85. Fusco Girard, L.; Baycan, T.; Nijkamp, P. *Sustainable City and Creativity: Promoting Creative Urban Initiatives*; Fusco Girard, L., Baycan, T., Nijkamp, P., Eds.; Routledge, Taylor & Francis Group: Abingdon, UK, 2012; ISBN 131704794X.
86. Donadieu, P. *Campagne Urbane. Una Nuova Proposta di Paesaggio Della Città*; Donzelli: Roma, Italy, 2013; ISBN 9788860369666.
87. Council of Europe. *Framework Convention on the Value of Cultural Heritage for Society*; Council of Europe: Strasbourg, France, 2005; pp. 2720–2722.
88. United Nations. *World Urbanization Prospects: The 2014 Revision, Highlights*; United Nations: New York, NY, USA, 2014.
89. FAO. *Food for the Cities Programme—Building Sustainable and Resilient City Region Food Systems*; FAO: Paris, France, 2015.
90. Dematteis, G. *Montanari per Scelta. Indizi di Rinascita Nella Montagna Piemontese*; Franco Angeli: Milano, Italy, 2011.
91. Varotto, M. *La Montagna che Torna a Vivere. Testimonianze e Progetti per la Rinascita Delle Terre Alte*; Nuova Dimensione: Venezia, Italy, 2013.
92. De Rossi, A. *Riabitare l'Italia. Le Aree Interne tra Abbandoni e Riconquiste*; Donzelli: Roma, Italy, 2018.
93. Osti, G.; Jachia, E. *AttivAree. Un Disegno di Rinascita Delle Aree Interne*; Il Mulino: Bologna, Italy, 2020.
94. Varotto, M. *Montagne di Mezzo. Una Nuova Geografia*; Einaudi: Torino, Italy, 2020.
95. European Commission. *European Skills Agenda—Employment, Social Affairs & Inclusion*. Available online: <https://ec.europa.eu/social/main.jsp?catId=1223&langId=en> (accessed on 7 February 2021).
96. Artmann, J.; Huttenloher, R.; Kawka, R.; Scholze, J. *Partnerships for Sustainable Rural-Urban Development: Existing Evidences*; Federal Institute for Research and Building, Urban Affairs and Spatial Development: Bonn, Germany, 2012.
97. OECD. *Rural-Urban Partnerships: An Integrated Approach to Economic Development*; OECD Publishing: Naples, Italy, 2013.
98. Gaitán-Cremaschi, D.; Palomo, I.; Baraibar Molina, S.; De Groot, R.; Gómez-Baggethun, E. Applicability of economic instruments for protecting ecosystem services from cultural agrarian landscapes in Doñana, SW Spain. *Land Use Policy* **2017**, *61*, 185–195. [[CrossRef](#)]
99. Varotto, M.; Rossetto, T. Geographic film as public research: Re-visualizing/vitalizing a terraced landscape in the Italian Alps (Piccola terra/Small land, 2012). *Soc. Cult. Geogr.* **2016**, *17*, 1140–1164. [[CrossRef](#)]
100. CLIC Project CLIC Startup Competition: Boosting Innovation in Cultural Heritage. Available online: <https://www.clicproject.eu/startup-competition/> (accessed on 7 February 2021).
101. Pappalardo, S.E.; Gislimberti, L.; Ferrarese, F.; De Marchi, M.; Mozzi, P. Estimation of potential soil erosion in the Prosecco DOCG area (NE Italy), toward a soil footprint of bottled sparkling wine production in different land-management scenarios. *PLoS ONE* **2019**, *14*, e0210922. [[CrossRef](#)] [[PubMed](#)]
102. Erban, F. *L'Italia Che Non Ci Sta. Viaggio in un Paese Diverso*; Einaudi: Torino, Italy, 2019.

- 
103. Van der Ploeg, J.D. *The New Peasantries: Struggles for Autonomy and Sustainability in an Era of Empire and Globalization*; Sterling: London, UK, 2008.
  104. Toffler, A. *The Third Wave*; Bantam Books: New York, NY, USA, 1990.
  105. UN-Habitat. *Urban-Rural Linkages: Guiding Principles. Framework for Action to Advance Integrated Territorial Development*; UN-Habitat: Nairobi, Kenya, 2019.
  106. FAO. Food for the Cities Initiative. Available online: <http://www.fao.org/fcit/fcit-home/en/> (accessed on 30 January 2021).