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Agroforestry as a Driver for the Provisioning of Peri-Urban Socio-Ecological Functions: A Trans-Disciplinary Approach

Alice Giulia Dal Borgo [1], Gemma Chiaffarelli [2,*], Valentina Capocefalo [1], Andrea Schievano [3], Stefano Bocchi [3] and Ilda Vagge [2]

[1] Department of Heritage and Environment, University of Milan, 20122 Milan, Italy; alice.dalborgo@unimi.it (A.G.D.B.); valentina.capocefalo@unimi.it (V.C.)
[2] Department of Agriculture and Environmental Sciences, University of Milan, 20122 Milan, Italy; ilda.vagge@unimi.it
[3] Department of Environmental Science and Policy, University of Milan, 20122 Milan, Italy; andrea.schievano@unimi.it (A.S.); stefano.bocchi@unimi.it (S.B.)
* Correspondence: gemma.chiaffarelli@unimi.it

Abstract: Peri-urban rural system rehabilitation is pivotal to the socio-ecological balanced functioning of urban systems. In this paper, we investigate the performance of agroforestry participative practices in rehabilitating peri-urban belts (in-field productive agroforestry; between-field landscape features). We test a new trans-disciplinary, multi-level analytical framework for the ecosystem services (ESs) assessment based on site-specific socio-ecological information. We parallelly analyse ecological and cultural traits: 1. agroecosystem components (flora–vegetation; human community); 2. their organization at the landscape level (landscape eco-mosaic; cultural landscape); and 3. their socio-ecological functions/processes. We compare the current state with a transformation scenario. The first application to the "Milano Porta Verde" agroecology hub, Italy, outlined: 1. the agro-eco-mosaic structuring and diversification improvement consequent to the agroforestry model spread (higher natural components percentage, agricultural patch shape complexity, landscape heterogeneity, landscape structural diversity, connectivity and circuitry); and 2. the cultural functions provided by participative practices (40 initiatives; 1860 people involved; 10 stakeholder types), enabling cultural landscape rehabilitation processes (higher accessibility, citizen empowerment, community and knowledge building, cultural values building). These results qualitatively inform the ES analysis. The potential ES supply matrices and maps showed an increase, through a transformation scenario, in the total ESs delivered by natural components (+44% support ESs; +36% regulating ESs) and agricultural components (+21% cultural ESs; +15% regulating ESs).

Keywords: agroforestry; peri-urban; trans-disciplinarity; multi-level assessment; ecological functions; cultural functions; landscape ecology; behavioural geography; ecosystem services

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1. Introduction

The decline in biodiversity and ecological functionality of terrestrial ecosystems is increasingly, and less and less reversibly, compromising the ability of natural and semi-natural systems to support and contribute to both the well-being and economic prosperity of human communities [1–3]. Such contributions are easily undervalued in decision making, despite their related ecosystem services (ESs) that "*underpin our very existence*" [4] and that should not be overridden when dealing with human community well-being issues [3]. According to this, natural, agricultural and urban system management should underpin their functional integrity to guarantee ecological, social and economic stability over time [5]. The current vulnerabilities due to climate change enhance this urgency [6–9]. In this timely framework, sustainable metropolitan city development is an open issue, matching all these multiple dimensions. In this perspective, peri-urban rural belts play a strategic role: they are potentially able to reconnect urban functionalities with their surroundings, solving the environmental and cultural gaps (and consequent critical weaknesses and challenges) derived from the urban sprawl of recent decades [10,11].

In detail, on the ecological side, peri-urban areas have a high detriment of landscape metastability values, impairing their semi-natural and agricultural component resistance and resilience capacities [12–15]. Peri-urban rural system ecological functions are easily undermined by fragmentation and high disturbance levels, which prevent them from evolving towards higher complexity and diversification levels [16–18]. This implies multiple knock-on effects on their biotic and a-biotic environmental compartments: qualitative biodiversity impairment [18,19]; simplified community structures [20–22]; and low regulation contributions on hydrological [23,24] and microclimatic [25] dynamics. These trends directly and indirectly undermine agroecosystem autoregulation processes, resulting in greater dependence on external energetic and resource inputs [26]. In a historical climate change context, these issues are crucial [27–29]. This is especially true if we consider the opposite potential role of peri-urban systems in delivering agri-environmental support, regulating and provisioning services to the city [10,12,30]. On the social–cultural side, peri-urban contexts are easily marked by a fragmented social tissue, disrupted cultural places and low socio-cultural resilience. Their typical landscape homologation, often marked by abandonment and degradation processes, triggers critical dynamics of detachment from places. Conversely, where the landscape becomes more complex (on its qualitative, substantial and accessibility traits), it starts performing pivotal socio-cultural functions again, enriching itself with new meanings [31,32]. These two ecological and cultural concerns are directly interrelated (vicious and virtuous cycles).

Hence, the shortcomings and needs of metropolitan systems are demanding for the integration of multifunctional, widespread solutions. The integration of new socio-ecological functions among rural–urban interfaces can be a structural response to this demand. To this end, the urban-nature-based solutions framework offers targeted solutions [33–38]. Among them, the adoption of agroforestry practices can be a suitable, viable and effective multipurpose response, by making agricultural, natural and cultural functions positively coexist, as several studies already substantiated, both in tropical and temperate regions [39–42]. Both hard and soft sciences should orient such processes through trans-disciplinary approaches [43]. This would help in understanding the ecological behaviour of peri-urban landscapes and their socio-ecological gaps and latencies that may be deployed by their management through agroforestry practices, conceived as drivers for their organic, effective and coherent rehabilitation.

To this aim, the ecosystem services (ESs) approach offers a viable methodological framework. On the ecological side, the ES approach is by now universally accredited [44,45], and robust scientific evidence from meta-analyses is already available on the positive effects of agroforestry practices on a wide spectrum of ESs [42,46,47]. Cultural insights can also be deployed using the cultural ecosystem services (CESs) framework, which has constantly evolved in recent decades [48], and which has already provided interesting insights on agroforestry-related CESs [49]. Regarding CESs, scientific debate is still open, referring to: their definition [3]; their accounting issues (subjectivity, cultural biases, mutual interactions effects, material and non-material components [50,51]); and their related ethical issues [52,53] tied to payment systems for ecosystem services (PES) [54]. This led to the recent introduction of new theoretical frameworks, e.g., the IPBES Nature Contribution to People framework [55,56], which are still not unanimously acknowledged.

Several ES assessment tools already exist [57–61] and have already been applied to urban systems green infrastructures [62]. These tools have high potential to produce reliable, robust and cost-effective ES evaluations and account for monetary values. However, they usually rely on standardised databases and fixed data-entry structures, which can constrain the integration of specific multi-disciplinary datasets (e.g., see InVEST© spatial-based model) [63]. For instance, floristic–vegetational and landscape ecology spatial-based data include relevant ecological information, which is not always organically included among ES models. This is especially true for floristic-vegetational multi-scale information.

Similarly, cultural data derived from sociological and geographical surveys might not easily be included. The CES value is often omitted from assessments because of source data unavailability [48,50]. For instance, ES assessments were already applied to the here-presented case study and were based on i-Tree Eco/i-Tree Forecast modelling tools [64]. They rely on pre-existing data libraries, and they focus on four specific ESs, which are delivered by two scenarios forecasting the implementation of agroforestry treelines and hedgerows. On one side, i-Tree tools offer a standardised, validated methodology, and allow us to account for monetary values. On the other side, they require a fixed data entry structure and do not allow for the inclusion of targeted ecological indicators, which might be better suited to the project aims and to the specific socio-ecological traits of the context under study. ES assessment would benefit from the integration of multi-level, multi-disciplinary, and diversified input information. Pre-existing tools assessments could be usefully integrated by broader approaches [65], which might provide less precise but more accurate results, by better representing the ongoing ecological and cultural processes. This would support a coherent information of local requalification strategies [66–68].

Based on these premises, our research project deals with the development of a trans-disciplinary methodological framework for the analysis and assessment of the ecological and socio-cultural functions and services related to agroforestry practices. Specifically, it deals with a rural peri-urban area in south-east Milan edges (Po Plain, North of Italy) (Figure 1). Here, the Milano Porta Verde (MPV) initiative developed a strategic vision to make this under-used area a new agroecology hub. This is guiding the ongoing requalification, inspired by innovative paradigms also including agroforestry practices [69]. We here intend with agroforestry practices two main approaches: 1. productive in-field agroforestry, that is, the combination of fruit trees and biomass trees in a multistorey arrangement with annual crops or grass (Figure 1b,c, blue dotted line); and 2. between-fields landscape features, that is, hedgerows, treelines, woodland, filtering woody strips (Figure 1b, local scale, red dotted line). Both approaches are supposed to support the structuring and diversification of the landscape agro-eco-mosaic, which are proxies for the agroecosystem environmental stability, resistance and resilience capacities [41,70,71]. Also, both approaches support the adaptation to climate change and its mitigation [39]. Moreover, the agroforestry components are designed and managed through participative and didactical approaches. This paves the way for the reactivation of socio-cultural functions [49].

On the ecological side, the study is based on a multi-scale approach. Landscape ecology and landscape bionomics approaches are applied. We here present the qualitative-quantitative analyses led on extra-local and local-scale landscape systems. They complement the field scale floristic–vegetational analyses, whose first results were already published [72]. Two scenarios are compared: current state (CS) and a transformation scenario (TS). TS represents an expansion of the agroforestry model across the MPV area (in-field productive agroforestry and between-fields landscape features) (see Section 2.3 for further details). On the cultural side, the study investigates how the implementation of agroforestry projects through participative approaches can foster the generation of CESs (identification of their typology, quantity and beneficiaries). We test an initial set of indicators referred to territorial sciences tools and action-research practices: participant observation [73]; surveying of socio-cultural activities (iconographic and multimedia records); targeted opinion polls (a pilot audience target is presented in this paper); community mapping (still ongoing).

A new composite system of qualitative-quantitative indicators is built and tested. It describes the ecotope traits, the landscape system structure, the community components and their relationship with the cultural landscape. They are interpreted in terms of ecological and cultural functions. The analytical results and their functional interpretation qualitatively inform a preliminary assessment of spatial-based ESs. The next goal will be the development of a synthetic ESs delivering indicator, to resume the multi-faceted components that concur to peri-urban socio-ecological requalification. Such an approach is conceived as a scalable tool that could be applied in analogous contexts.

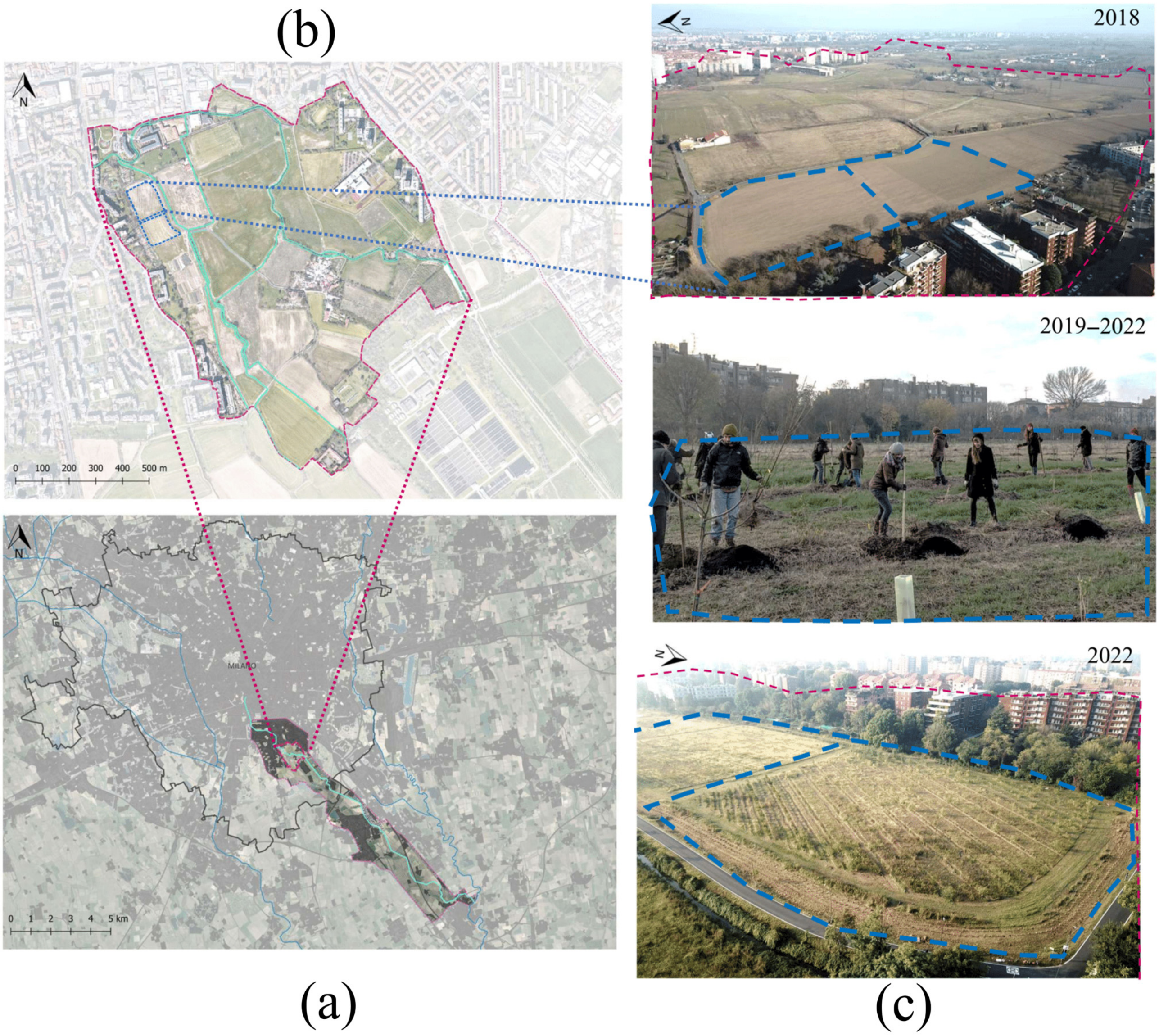

Figure 1. (**a**) The study area location (local scale boundaries, red dotted line) among the Milan south-eastern peri-urban belt, highlighting the extra-local scale boundaries (rose dotted line), corresponding to the Vettabbia Valley landscape system. (**b**) The study area: local scale boundaries (red dotted line) and field scale ongoing productive agroforestry (AF) projects (blue dotted line). (**c**) AF area changes between 2018 and 2022: from crop-field to a community-based agroforestry system.

2. Materials and Methods

2.1. Study Area

The study area provides peculiar territorial, environmental and historical traits. It is an agricultural area of about 100 hectares (local scale) located in the Milan south-eastern edges, next to the last city buildings. Details on the territorial context (geomorphology, paedology, hydrology, climate, bioclimate, flora, vegetation, ecology) can be found in previously published works [72]. The area belongs to the Rural Park South Milan and the Vettabbia Valley system, an historical ditch flowing out of the city into its rural surroundings (Figure 1). The Vettabbia ditch historically sustained the city–countryside commercial connection: this area has been a relevant productive land for ages. Nowadays, it belongs to the underused urban rural edges (Figure 1). The Openagri project [74] and the Milano Porta Verde (MPV) bottom-up initiative proposed a strategic vision for the implementation of a peri-urban agroecology hub. MPV was also recognised by the European "Liaison" framework as an ambitious European Rural Innovation Ambassadors pilot project [69]. These experiences frame and guide the ongoing socio-ecological rehabilitation processes, based on agroecology and agroforestry practices. All these experiences already inspired some methodological insights on the ongoing agroecological requalification processes [72,75–77]. In the field, such processes are sustained by non-profit organisations, which activated an applied agroecology project in 2018 (Figure 1, in blue), also with the support of the Milan Municipality. Two experimental plots (2 ha) with productive in-field agroforestry systems (AF) were designed and implemented (Figure 1b,c, blue dotted line). 12,000 fruit and biomass trees and shrubs were inserted in multistorey arrangement with grass strips. They belong to more than 40 species and 32 fruit cultivars. Citizens were directly involved in its implementation through participative approaches (didactical activities, plantings and other agroecological activities). The aim is to develop a bottom-up local, regenerative, supply chain [78]. Agroecological principles are adopted (no pesticides, chemical fertilisers and irrigation), including phytoremediation strategies. Productive and production-supporting elements are managed through intensive pruning and biomass inputs to the soil to facilitate greater dynamism, complexity and productivity [26,79–82].

2.2. Premise: The Applied Multi-Level Methodology and ES Assessment Approach

Figure 2 shows the analytical and interpretative methodology we set up. It was directly inspired and readapted from Babì Almenar's work [83]. We kept a conceptual parallelism between the multi-level assessment of the ecological and cultural system: from single component behavioural traits (floristic–vegetational traits; human community traits) to structural spatial patterns (landscape eco-mosaic structure; cultural landscape); to the consequent supported functions and processes (landscape ecological functions; cultural functions); and to the resulting ecosystem services delivered (support, provisioning, regulating and cultural) (Figure 2).

The ES assessment is both informed by the following: field scale data (floristic–vegetational traits of ecotopes; traits of the human community linked to the agroforestry productive patches); and local landscape scale data (spatial information coming from landscape ecology analyses; cultural landscape dynamics coming from community surveys). We considered the functional role of the landscape ecological infrastructure in supporting the delivering of ecosystem functions and services, making reference to the landscape services framework [65,83–85].

We present here detailed methods and results on the following: 1. local-scale landscape ecological analyses; and 2. field-scale (human community level) and local-scale landscape (cultural landscape dynamics) socio-cultural analyses (Figure 2, dark green boxes). Methods and results on field-scale floristic–vegetational analyses (Figure 2, white boxes) are explained in previous authors' works [72,76]. All these analyses brought to the identification of significant ecological and cultural functions are related to the most significant land use types (Figure 2, dark green boxes). This was the starting point for translating the analytical results into a qualitative, spatial explicit, ES assessment (Figure 2, light green boxes). Despite the most recent trends in ES assessment not including support ESs [86], we included them for the deeper ecological information they disclose. Indeed, our aim is to deliver workable tools to orient and encourage public administration, policies and private initiatives through substantial, coherent socio-ecological information. Economic quantitative outputs are not the primary goal. We referred to MEA [3] and TEEB [25] ES classifications, from which we selected 24 ES types (2 types for support ESs; 5 types for provisioning ESs; 12 types for regulating ESs; 5 types for cultural ESs) (details on single ES types can be found in Section 3.3). In line with similar studies [49], we adopted MEA's categories for cultural ESs (i.e., the benefits originated from the humans–nature interaction [87]). We grouped CESs into five categories: 1. sense of place, grouped with spiritual experience; 2. aesthetic values (based on appreciation of the natural scenery [88]); 3. educational; 4. recreational and eco-tourism; and 5. emotional values, merged into health category.

These CES categories are intended to depict the intrinsic value of agroecosystems [89,90], their legacy values [91] and relational ones [92].

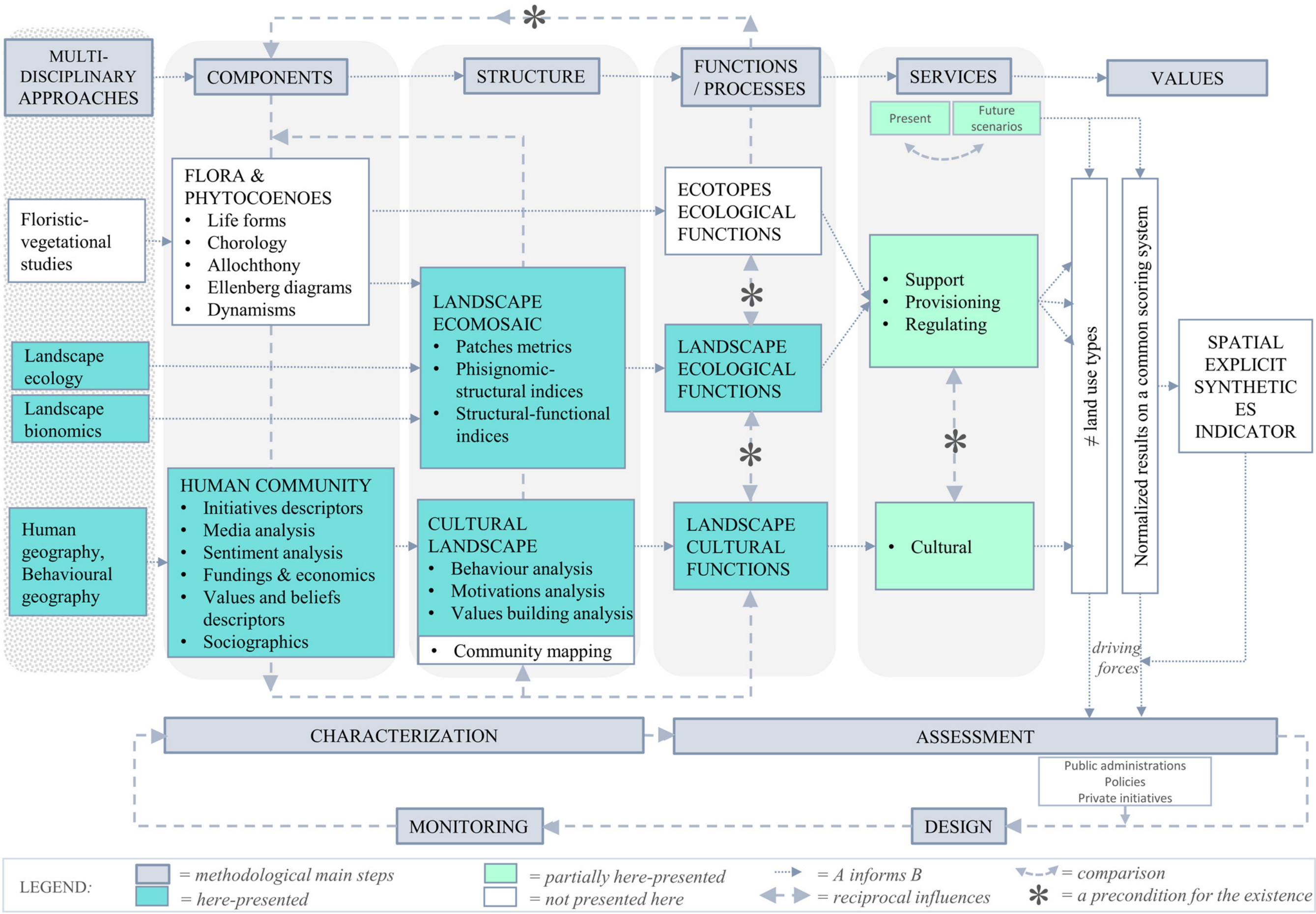

Figure 2. The multi-level analytical methodological framework enclosing the analyses presented in this paper (dark green boxes), also showing the analytical steps, which are partially here-addressed here (light green boxes) and the other parallel characterization and assessment steps framing our study objectives but not presented in this paper (white boxes).

In this preliminary phase, ES supplies were qualitatively estimated, referring to similar ES assessment experiences [67]. We referred to land-use-based approaches [93], considering the potential ES supply. An ES scoring system was applied to each CS and TS land use category (ES potential matrix method [94]), clustered between four landscape sub-systems: natural (NAT), agricultural (AGR), anthropic (ANT) and hydric (HYD). In line with Semeraro's work [67], qualitative scoring (4-value scoring system, range: [1,4]) was based on the analytical results presented in: this study; previous studies results [64,72,75,76,78,95–97]; bibliographic resources [42,46,47,67,94,98,99]; and expert evaluation. Cumulated ES supply was calculated for each of the four y-ES categories (ES_y = (Support, Provisioning, Regulation and Cultural)). For each land use category, each cumulated y-ES category scoring was normalised to 100 as follows:

$$ES_y = \frac{\sum_i^{n_y} ES_{yi}}{\sum_i^{n_y} MAX(ES_{yi})} \times 100 \; with: \; MAX\,(ES_{yi}) = 4; \; ES_{yi} = [1,\,4]; \; ES_y = [0,\,100],$$

where ES_{yi} represents single i-ES supply values belonging to the y-ES category, and ES_{yi} numerosity $[1, n_y]$ depends on the y-ES category. Consequently, the normalised values of the total ES supply (ES_{tot}; cumulation of the four y-ES categories scorings) were obtained for each land use category as follows:

$$ES_{tot} = \frac{\sum_1^4 ES_y}{\sum_1^4 MAX(ES_y)} \times 100\ with:\ MAX(ES_y) = 100$$

Then, mean ES_y and ES_{tot} values for each landscape sub-system (NAT, AGR, ANT, HYD) were obtained through the arithmetic mean of ES_y and ES_{tot} values of the land use categories belonging to each landscape sub-system.

Then, we translated these results into a spatial representation. We mapped the total ES supply values (ES_{tot}) for each landscape patch type (land-use-based approach) using QGIS software (QGIS Desktop 3.26.0). This allowed us to account for the specific socio-ecological traits of the study area and to reach greater detail in land use typifying and in socio-ecological traits featuring, if compared to pre-existing ES modelling tools (e.g., InVEST© model). The next step will be the quantitative translation of analytical results into a common scoring system, then the synthesis of a single, spatially explicit, potential ES supply indicator (Figure 2, right side, white boxes). This methodological framework could positively be powered by the further integration of the analytical results related to other environmental matrices (such as soil).

2.3. Landscape Eco-Mosaic Data Collection and Analysis

The landscape eco-mosaic was studied based on its structural and functional traits through a multi-scale approach. Extra-local and local-scale landscape analyses (QGIS software) were based on the landscape ecology [100–102] and landscape bionomics methodologies [103,104]. As a contextualizing premise, the surrounding environmental and regulatory context was featured [72,75,76].

Extra-local landscape system analysis was useful to contextualise the forthcoming local-scale (landscape eco-mosaic) and field-scale (flora, vegetation) analyses [24]. Extra-local-scale boundaries (overall surface: 2373 ha) were identified according to Ingegnoli's landscape unit and ecotope concepts [103]. Land use typifying was based on land use and covers the 2018 regional map (Dusaf.6, scale 1:10,000 [105]), corrected through satellite images comparison (Ortofoto Agea 2018, 0.2 m resolution [105]) and coarse field surveys. Accordingly, the current structural elements of the landscape mosaic (matrix, patches, corridors, boundaries) were mapped as vectors and quantified (number, surface, perimeter (minimum patch size: 620 m^2)) (Supplementary Materials, Table S1). Patches were clustered in NAT, AGR, HYD and ANT landscape sub-systems (see Section 2.2). Making reference to the eco-tissue model [103], landscape physiological apparatuses were identified and quantified.

Local scale boundaries identification (overall surface: 114 ha) and land use typifying were based on the same extra-local-scale criteria (with more detailed field surveys checks). We included the areas interested in by the MPV requalification scenario. Two scenarios were assessed: 1. current state (CS), with productive agroforestry systems, diffused fallow grasslands, crop fields, discontinuous linear spontaneous vegetated corridors along ditches, some young woody plantations and small, degraded woody areas; and 2. transformation scenario (TS), where the agroforestry management model is extended across the whole area [69,72,74–77] through productive in-field agroforestry systems of different complexities (alley cropping; complex, multi-strata systems), and linear and areal landscape features (hedgerows, tree-lines, woodlands, filtering wood strips, wetlands). CS landscape mosaic elements were mapped for the extra-local scale with finer resolution (minimum patch size: 55 m^2) and higher detail on patches categorisation, which was based on available floristic, vegetational and landscape information [72,75,76]. Similarly, TS elements were mapped, referring to MPV design forecasts (projection to 10 years after design implementation, concluded within 5 years from present) (Supplementary Materials, Table S2).

We selected the landscape ecology indices referring to the following: previous experiences on similar contexts [106]; their effectiveness towards the study purposes and coherently with literature insights [19,102,107,108]; and their suitability for design applications (recurring use in landscape design projects in the regional context [13,14,109–111]). We provided different insights at the local- and extra-local scale (Appendix A, Table A1). Weighted connectivity and circuitry values (WCON, WCIR) were based on a synthetic weighting system, recently tested on other case studies; it attributes different weights to links based on their belonging to five Ecological Quality Classes (EQCs) [106]. The Biological Territorial Capacity index (BTC_ha) synthetically represents the different patch-type contributions to the overall landscape system metastability [103,104], for which we used literature specific values (BTC_i) [103,112].

We applied the indices set to extra-local and local-scale patches, clustered according to patch types. The results were cumulated to NAT, AGR, HYD and ANT landscape sub-systems and to the total landscape system (TOT). The results were compared at their absolute values and through percentage gaps evaluation, following an already applied approach [106]. TS was compared to CS; both CS and TS were compared at the extra-local scale. As a result, we assessed the influence of CS and TS (with respect to extra-local-scale context) and TS (with respect to CS) on the structural and functional landscape diversification.

2.4. Cultural Data Collection and Analysis

Cultural analyses were focused on the role of AF as a cultural medium (Figure 1, in blue). Here, since 2019, there have been a number of cultural initiatives involving diversified local community target groups. In most cases, AF was the main focus of activities: participants directly interacted with it (e.g., by observing or learning how to fulfil care and management activities, such as mulching, pruning, grafting, sowing, planting and harvesting). In others, AF served as a simple backdrop for initiatives not directly related to agroecology but somehow connected to its physicality and material essence (indirect interaction). All the analysed cultural components and dynamics were retrieved from the practices and activities related to AF. Hence, the contributions to functions and services are evaluated referring to the presence or absence of the AF model, which we interpreted as the main cultural medium. Indeed, no other influent drivers of cultural landscape evolution currently occur in the study area. This substantiates our interpretation of agroforestry as the main influencing factor on changes in cultural dynamics in the study area.

2.4.1. Human Community Components: An Initial Qualitative–Quantitative Census

The wealth of cultural activities organised thanks to the presence of AF prompted us to develop a set of human community components indicators. We censused these initiatives and identified an initial taxonomy. We considered the following: qualitative–quantitative descriptors of the initiatives; stakeholders' qualitative descriptors; media communication analysis; sentiment analysis (interactions such as comments and reactions related to dedicated posts); and funding and economics descriptors (Appendix B, Table A2).

2.4.2. Cultural Landscape: The Cultural Dynamics Enabled by AF

Agroforestry systems can be regarded as cultural landscapes in that they are designed, implemented and managed by individuals and communities. They impart specific characteristics that are closely related to local geography, environment and traditional agricultural management systems. The investigations on the cultural landscape dynamics complemented the evaluation of cultural functions and processes (e.g., the consequences of the interactions of the human community with local territory, by means of the studied AF). A qualitative questionnaire was set up and delivered to a first target sample (the volunteers involved in agroecological activities). The questionnaire finally aims to probe the CESs generated by the studied practices (Figure 2) and their impact on the local community. It consists of closed multiple-choice, open-ended, and scaled questions, where qualitative components are supported by quantitative data. It is divided into five typological sections and it is structured according to behavioural geography epistemological and methodological principles [113,114]. Sections are organised as follows:

1. Behaviour analysis: time-related information on volunteers' attendance (single choice);
2. Personal motivations analysis (motivations behind the decision to devote part of one's time to agroforestry care and management activities) (multiple choice; maximum of 7 choices);
3. Behaviour analysis: volunteers activities typology (agroecological activities, public events, training courses and individual enjoyment) (multiple choice; maximum of 14 choices);
4. Value-building analysis: (level of agreement with respect to some given propositions related to the production of aesthetic-landscape value, social relations, sense of belonging to a community, connection with nature, spiritual and emotional experience, and educational and training function) (single choice; 5-value rating scale: 5—'completely agree', 4—'really agree', 3—'agree', 2—'neutral', 1—'completely disagree');
5. Sociographic properties: complementing the human community component assessment (single and multiple choice).

The value-building analysis specifically informed the cultural dimension of ESs. The results for each *i*-cultural value category were obtained by considering their $\overline{x}_i$ weighted mean values (weighted on votes percentage for each rating scale value, ranging from 1 to 5; with $\overline{x}_i = [1-5]$), then normalised to X_i (with $X_i = [0-100]$) according to the following equation:

$$X_i = \frac{(\overline{x}_i - x_{min})}{(x_{max} - x_{min})},$$

where $x_{min} = 1$ and $x_{max} = 5$. A word cloud was built on the acknowledged states of mind linked to AF experiences by respondents; words were weighted based on their frequency values [115].

3. Results and Discussion

3.1. Landscape Ecology Results

3.1.1. Extra-Local Scale

The extra-local-scale landscape apparatuses analysis (Figure 3) highlighted the predominance of the productive agricultural apparatus (47%); subsidiary and residential apparatuses follow (respectively, 19% and 18%), while protective (7%), resilient (4%), connection (1%) and stabilization (1%) apparatuses are strongly under-represented. This current physiological configuration of the landscape system underlines a highly compromised balance for what concerns the landscape system metabolism. This entails direct and indirect consequences on the environmental stability parameters of the existing agroecosystems, which might face stronger vulnerabilities due to the lack of regulative functions of their peri-urban context [103,116].

Extra-local-scale landscape ecology analyses (Table 1; Figure 4a) confirmed the unstable status of the agricultural matrix (AGR MTX: 46.2%); 60% is normally the minimum required extension for supporting a balanced agricultural landscape behaviour [103,117,118]. NAT components are highly underrepresented (NAT MTX: 6.8%); this entails a low probability of persistence of their habitat-related species [119]. AGR and NAT dynamics are expected to be strongly influenced by the anthropic components (ANT MTX: 44.6%). Agricultural patches are on average oversized (AGR MPS: 1.92 ha; range [0.55, 3.99]; σ = 1.20). This implies a reinforcement of their sink behaviour (source-sink model [120]); they easily act as diversity subtracting areas. Nevertheless, their size variability is noticeable. Semi-natural components registered relatively high mean NAT SI values (mean value: 81.8 m; range [54.6, 117.2]; σ = 21.7). In a compromised agricultural matrix interweaved with the anthropic one, high NAT shape complexity values mean higher exposure to disturbances and consequent vulnerability of semi-natural components. DIV_1a heterogeneity values are relatively low for NAT (0.29), confirming their need for higher diversification. The highest DIV_1a value was registered on ANT patches. Similarly, PERM values show the high impairment level of NAT components contribution to the hydrological balance (162.0 ha of permeable surface versus 1097.2 ha from AGR patches).

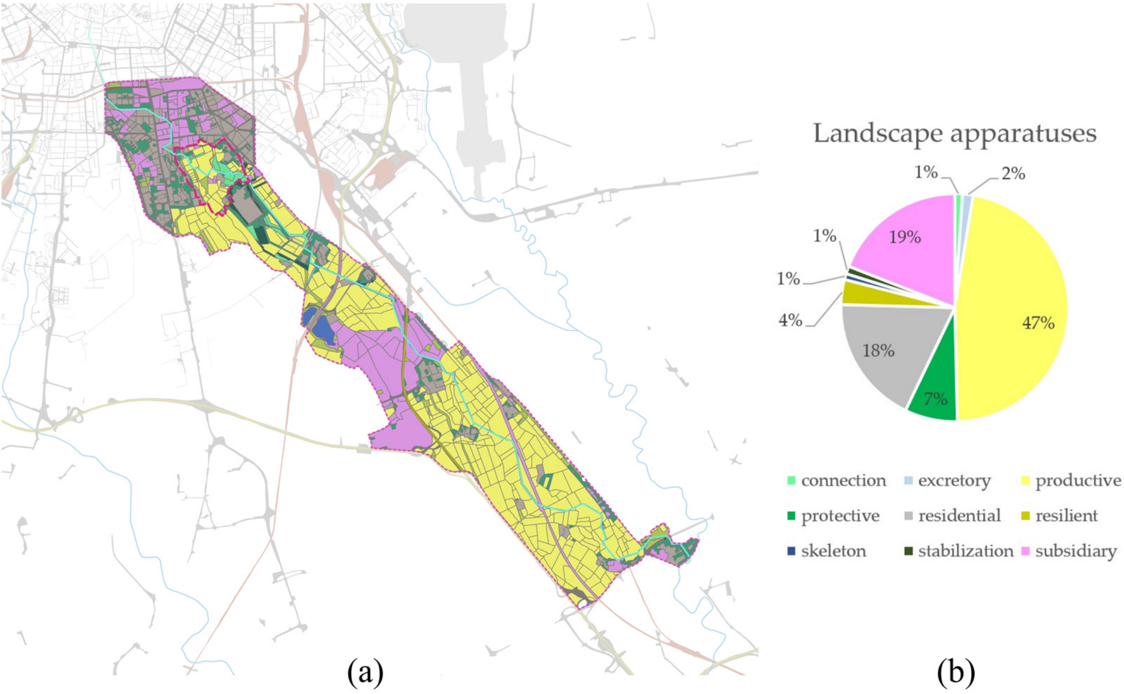

Figure 3. (**a**) Landscape apparatuses spatial configuration (extra-local-scale Vettabbia Valley system (rose dotted line); local-scale study area (red dotted line)). (**b**) Relative proportions of extra-local-scale landscape apparatuses (% surface).

Agricultural patches give a high relative contribution to the overall landscape BTC_ha (46%; mean BTCi: 1.49 Mcal/ha/year; range [0.8, 2.7]; σ = 0.65). Higher AGR BTC_ha values are mostly due to AGR surface extension rather than to high BTCi values. For instance, conventional crop fields (low BTCi values (0.8 Mcal/ha/year); high relative surface (76% of total AGR surface)) contribute to 69% the of total AGR BTC_ha; agroforestry systems (high BTCi values (2.7 Mcal/m^2/year); low relative surface (0.3%)) only contribute to 0.9% of total BTC_ha. In an agricultural landscape, which is mainly conventionally managed and has highly simplified landscape feature infrastructure, the high AGR BTC_ha values mark the underrepresentation of semi-natural patches (the ones who mostly support metastability functions among rural systems) [14]. Indeed, semi-natural patches only contribute to 14% of the overall BTC_ha even though they have higher BTCi values (mean BTCi: 1.86 Mcal/ha/year; range [0.9, 3.0]; σ = 0.78). These results confirm that the current landscape needs higher agricultural patch diversification. This could be obtained by increasing the portion of NAT patches and AGR patches, and by managing them through practices with higher BTCi-related values (like agroforestry systems, orchards and permanent grasslands).

These results are an important premise to the interpretation of local scale results. They inform on upper-scale landscape vulnerabilities, which can enhance the deterioration of local-scale ecological processes and which should be taken into account when building local-scale requalification strategies.

Table 1. Landscape ecology analyses results, cumulated for NAT, AGR, HYD, ANT and TOT landscape sub-systems (respectively, for extra-local and local-scale landscape systems (current state (CS) and transformation scenario (TS))). In detail: Ai: area; Pi: perimeter; NP: number of patches; MPS: medium patch size; MTX: matrix; SI: shape index; DIV_1a-DIV_1b: landscape diversity indices; DOM_1a: landscape dominance index; LSD_1a: landscape structural diversity index; PERM: permeable surface; BTCi: land-use-type-specific biological territorial capacity (mean value); BTC_ha: areal biological territorial capacity.

Scale	Sub-System	Scenario	Patches Metrics						Physiognomic–Structural Indices				Structural–Functional Indices		
			Ai	**Pi**	**NP**	**MPS**	**MTX**	**SI**	**DIV_1a**	**DIV_1b**	**DOM_1a**	**LSD_1a**	**PERM**	**BTCi**	**BTC_ha**
Extra-local	HYD	CS	56.0	44,701	5	11.20	2.4	168.4	0.09				56.0	3.000	168.1
	NAT		162.0	84,641	134	1.31	6.8	409.0	0.29				162.0	1.920	294.9
	AGR		1097.2	259,282	335	1.92	46.2	477.1	0.73				1097.2	1.486	966.0
	ANT		1058.1	409,718	552	2.57	44.6	851.8	1.00				323.0	0.657	667.0
	TOT		2373	798,343	1026	4.25		477	2.10				1638.3	7.063	2095.9
Local	HYD	CS	1.2	7475	2	0.60	1.1	192.8	0.05	0.00	3.67	0.32	1.2		
	NAT		32.1	40,120	97	0.40	28.3	861.1	0.97	2.17	2.77	5.60	32.1		
	AGR		48.7	19,522	47	0.83	42.8	234.6	0.94	1.35	2.77	5.44	48.6		
	ANT		31.6	26,962	98	0.40	27.8	470.1	0.94	2.11	2.77	5.45	17.5		
	TOT		114	94,079	244	0.56	100.0	248	2.91		2.99	4.20	99.4		
	HYD	TS	1.5	7858	4	0.32	1.4	220.7	0.07	0.63	3.67	0.45	1.5		
	NAT		35.7	43,229	113	0.49	31.4	867.0	1.06	2.20	2.66	5.98	35.7		
	AGR		46.1	22,191	58	0.57	40.5	282.5	0.99	1.53	2.95	5.88	46.0		
	ANT		30.3	25,712	92	0.42	26.7	455.9	0.90	2.04	2.83	5.23	16.4		
	TOT		114	98,990	267	0.45	100.0	262	3.01		3.03	4.38	99.7		

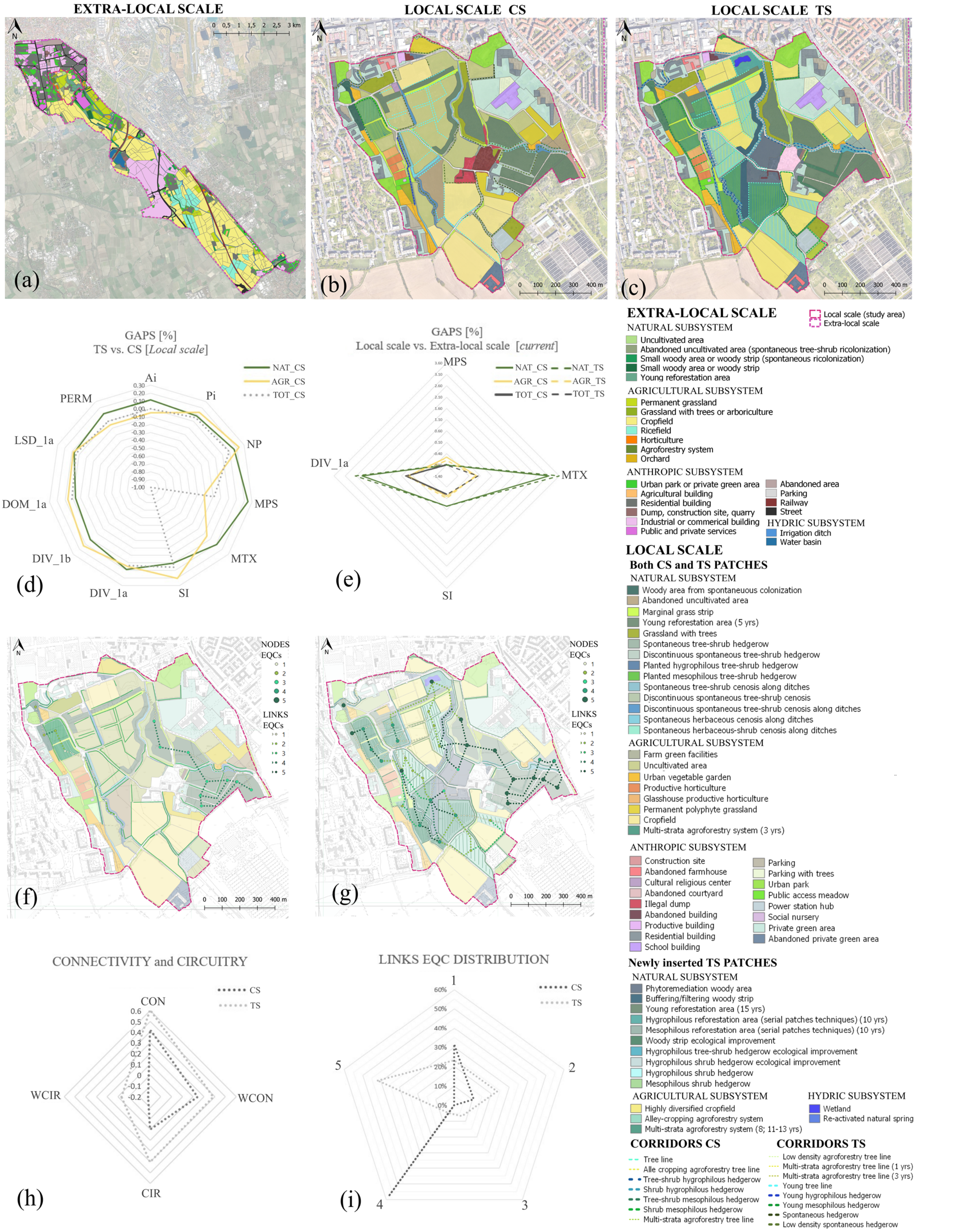

Figure 4. (**a**) Extra-local-scale eco-mosaic patches. (**b**,**c**) Local-scale CS and TS eco-mosaic patches. (**d**) Gaps between CS and TS landscape metric values on NAT, AGR and TOT sub-systems. In detail: patches metrics (Ai: area; Pi: perimeter; NP: number of patches; MPS: medium patch size; MTX: matrix);

physiognomic–structural indices (SI: shape index; DIV_1a-DIV_1b: landscape diversity indices; DOM_1a: landscape dominance index; LSD_1a: landscape structural diversity index); structural–functional indices (PERM: permeable surface; BTCi: land-use-type-specific biological territorial capacity (mean value); BTC_ha: areal biological territorial capacity). (**e**) Gaps between local-scale (separately, CS and TS) versus extra-local-scale landscape metric values on NAT, AGR and TOT sub-systems (MPS, MTX, SI, DIV_1a indices). (**f**,**g**) Local scale CS and TS connectivity components (links and nodes) belonging to different Ecological Quality Classes (EQCs = [1–5]). (**h**) CS and TS connectivity and circuitry values. In detail: CON: connectivity index; WCON: weighted connectivity index; CIR: circuitry index; WCIR: weighted circuitry index. (**i**) CS and TS links EQCs distribution (%).

3.1.2. Local Scale

Local-scale landscape ecology analyses highlighted an overall positive contribution of TS towards the physiognomic, structural and functional landscape traits if compared to CS (Table 1; Figure 4b,d).

The transition from CS to TS (Figure 4d) leads to a slow decrease in total AGR surface (−2.6 ha; −5% AGR MTX) to the benefit of HYD components (+29% HYD MTX (new wetlands)) and NAT components (+3.6 ha; +11% NAT MTX). The latter also benefit from the conversion of an illegal dump to phytoremediation woody areas (−4% ANT MTX). NP increases both for AGR and NAT, consequently improving grain values, with smaller AGR MPS (0.83 to 0.57 ha) and a slightly higher NAT MPS (0.40 to 0.49 ha). Both AGR and NAT shape complexity slightly increase in TS (+20% AGR SI; +1% NAT SI). Similarly, landscape heterogeneity values show an increase in TS, both for TOT (+3% DIV_1a), AGR (+5% DIV_1a; +13% DIV_1b) and NAT (+9% DIV_1a: +1% DIV_1b) patches. Parallelly, landscape structural diversity (LSD_1a) increases: AGR (+8%), NAT (+7%), and TOT (+4%).

The evaluation of percentage gaps between local CS and TS versus extra-local current state (Figure 4e) highlights the relative contribution of the local-scale-study-area CS to the extra-local-scale-system NAT equipment (+314% NAT MTX), with some further improvements through TS (+360%). Parallelly, the local-scale study area, and especially TS, give a positive contribution to landscape heterogeneity (DIV_1a) values if compared to the extra-local context (NAT: +235% (CS), +264% (TS); AGR: +30% (CS), +36% (TS)). Differently, NAT MPS is lower than in the extra-local context, suggesting the opportunity to further expand NAT patches to improve their source area effects. On the other hand, positive lower MPS values for AGR patches are highlighted for CS, and even more so for TS.

Passing from CS to TS, there is a significant increase in the number of links (19 to 60; +216%) and nodes (17 to 35; +106%) (Figure 4f,g). Moreover, their distribution among the five EQCs (Ecological Quality Classes) changes (Figure 4i). TS shows a more balanced distribution: the higher number and ecological quality of nodes allows for the activation of both higher EQC links (class 5) and lower EQC links (classes 2, 3). Differently, in CS only medium-to-low ecological quality nodes are present: they act as weakened, spatially fragmented source areas, and they only enable medium-to-high quality corridors to support localised ecological fluxes exchanges.

CON values also show an increase from CS to TS (0.42 to 0.61; +45%) (Figure 4h). WCON values embed the influence of the EQCs of links, and they also highlight the positive contribution of TS to the structural and functional connectivity across the area (0.24 to 0.39; +63%). CIR values markedly increase from CS to TS (0.10 to 0.40; +300%), while WCIR values are consistently decreased: low-quality links affect circuitry process evaluation (CS: −0.18; TS: 0.06).

3.1.3. Landscape Ecology Results Discussion

The results are interpreted based on the "effect of pattern on process" principle [102,119]. The applied indices refer to structural traits of the landscape patterns, which are then interpreted on their functional implications [108,119]. We referred to nonspecific groups of taxa representing two major behaviours: sensitive taxa (interior habitat); and generalist taxa (marginal, disturbed habitat). Indices are interpreted through their relative comparison to produce meaningful information [102,121]. Here, we assume agricultural open fields (primarily crop fields) are acting as landscape simplifiers from a sin-dynamic and landscape ecology perspective [26,117,122–124]. Among them, common generalist species are advantaged by recurring disturbances, high inner homogeneity, a low level of maturity (agroecosystems are kept to initial dynamic stages, selecting pioneer behaviours) [22,125,126]. We then assume an urban matrix as a primary driver of ecological community simplification as a consequence of habitat removal, and persistently high disturbance levels [18,21,127,128]. Among the urban–rural fringe, both open fields and urban patches influences occur and add up together. We also assume semi-natural landscape features (hedgerows, treelines, woody patches) as complexity drivers for the rural landscape [117,129]. Among them, edge species and, partially, more sensitive interior species (often of conservation importance) can find a gradient of open and interior habitat conditions. This significantly lowers the local extinction process risk among rural systems and raises biodiversity values [130–132] and agroecosystem resistance and resilience capacities [15,71]. Accordingly, AGR patches size (MPS) diminishing can be interpreted as a positive driving force towards higher agroecosystem diversification. Indeed, it enables a higher crop diversification and more surface available for diversified between-field micro-habitats [133,134]. This supports the expression of ecological supporting and regulating functions [71,117]. The slightly higher AGR shape complexity (SI) values (i.e., more curvilinear and convoluted patches shapes and boundaries) usually reflect an enhancement in species movements and genetic exchanges (flora and fauna) across different patch types (i.e., agricultural fields and between-field landscape features) [107,117]. This can be interpreted positively if we consider the overall increased environmental coherence and quality of AGR and NAT TS components. This facilitates more sensitive species mobility across the landscape and reduces their isolation patterns [117]. Heterogeneity values (DIV_1a) results only showed slight positive changes, which should be coupled with other indicator results for a correct interpretation. In highly anthropized and unstable contexts, heterogeneity values generally increase because of anthropic (residential, industrial, infrastructures) patches changes. Differently, in this case, the slight increase entirely depends on agri-environmental landscape changes (as included in TS) and should be positively valued [135]. Connectivity traits analysis accounted for the positive contribution given by TS linear landscape features insertion and by productive agroforestry-managed patches. The latter act as new medium-quality AGR nodes, which facilitate connectivity and circuitry functions across the agricultural matrix, especially if coupled with NAT woody patches [136,137]. This supports the hypothesis on the pivotal role that in-field agroforestry management can have a balance in supporting landscape ecological processes.

Taken together, all these structural TS changes are acknowledged to be positively correlated with ecological processes, such as biotic (trophic resources, genetic materials) and abiotic (energy) resources fluxes across the landscape [117,130,138]. Such structural changes are linked to areal, shape and spatial diversification trends and contribute to the lowering of sink functions overrepresentation [117,119,120,129,135]: higher ecological niche variability; easier refuge and reproduction area accessibility; higher permeability to individual and population movements; and consequently higher meta-population interconnection. Hence, agroforestry management can contribute to the lowering of local extinction (or spread inhibition) probability for more sensitive, interior habitat species, and can consequently help in buffering the neighbouring urban matrix impacts [10].

3.2. Cultural Analyses Results

3.2.1. Human Community

Appendix B, Table A2 summarises the results of the qualitative–quantitative census on the human community components. Although this is a partial analysis, which is constantly being updated through new initiatives, it already shows the richness and variety of the cultural components: +40 initiatives (19 from public fundings, 2 from private fundings, 19 from both); 10 local stakeholders categories involved; and about 1860 people involved. These components sustain the activation of cultural functions and processes and the consequent delivering of CESs.

3.2.2. Cultural Landscape

In our view, the CESs generated by AF transcend its physical boundaries and disclose a time–space resonance, fostering the emergence of a sense of community and cohesion, triggering multiple socio-territorial hybridization practices at the peri-urban edge. Such processes were depicted and confirmed by the first results on cultural landscape dynamics, presented below.

A total of 32 volunteers answered the questionnaire, representing a volunteer population of about 135 people who were contacted (network of directly involved supporters and regular attendees). Hence, in this scouting preliminary survey, sample size resulted limited; representativeness is expected to be improved through future surveys that are currently in the planning phase.

Behavioural analysis highlighted the presence of a core group of 12 people (37.5%) who have been frequenting the area since the beginning of the AF project (2019). These are the volunteers who have most assiduously and continuously contributed to the progress of the AF project. Over the 4 years, they have come to realise a strong sense of belonging and rootedness towards the area, translated into real actions of preservation and care. Only 7 people (21.9%) frequented the area even before the start of the AF project (e.g., walking or biking activities). This highlights the contributions of AF to the study area accessibility, both in physical terms (the area has been cleared and made walkable) and in terms of restoring shared meanings (people go to the area for specific reasons, sharing values and goals). This shows how AF currently acts as a new landmark, an individual and collective reference point with which to interweave relationships of meaning [139]. Indeed, more than 50% of volunteers regularly frequent the AF project (1–4 times a month; 2–10 h at a time, throughout all seasons) and actively contribute to its care (planting new trees (78.1%); sowing (50%); mulching activities (65.6%); mowing and biomass accumulation (25%); pruning (15%); social spaces self-construction and maintenance (28.1%); public events (65.6%); professional knowledge and skills provision (34.4%)).

Personal motivations analysis results (Figure 5a) emphasise the cultural aspects underlying the choice of becoming a volunteer, in addition to the activism attitude. A total of 90.6% of respondents made this choice to personally contribute to the creation of an urban AF project supporting soil regeneration and climate change mitigation, 71.9% appreciate the opportunity to meet people with whom they can share a common vision and feel part of a group, 65.6% want to "put their hands in the soil", 62.5% want to acquire new knowledge, 53.1% want to spend time outdoors in a natural environment in the city, 50.0% feel useful and gratified, and 15.6% want to explore new job opportunities. New activists were involved through the following channels: social networks (18.8%); university student groups (12.5%); informal networks of local associations (15.6%); and public AF events (12.5%). The respondents participated, to various degrees, in all activities and initiatives organised under funded projects (public plantings, parades, street actions, agroforestry courses and workshops, corporate events and art installations), which directly involved universities, local non-profit organizations and activist groups that were also funded by the Milan Municipality [140,141].

Value-building analysis (Figure 5b) helped in highlighting the cultural dimension of ESs [142,143]. Overall, 90.6% of respondents completely agree on the role of AF in increasing the aesthetic and landscape value of the area (6.3% really agree; 3.1% agree). A considerable percentage of respondents completely agree that spending leisure time within the AF project: increases their sense of connection with nature (81.3%); allows for a positive spiritual and emotional experience (78.1%); increases their knowledge on agroecology and agroforestry issues (68.8%); improves social relations quality (56.3%); and the sense of belonging to a community (59.4%). Overall, 93.8% of respondents completely agrees that AF initiatives can serve an important educational function towards children and adolescents living in highly urbanised settings.

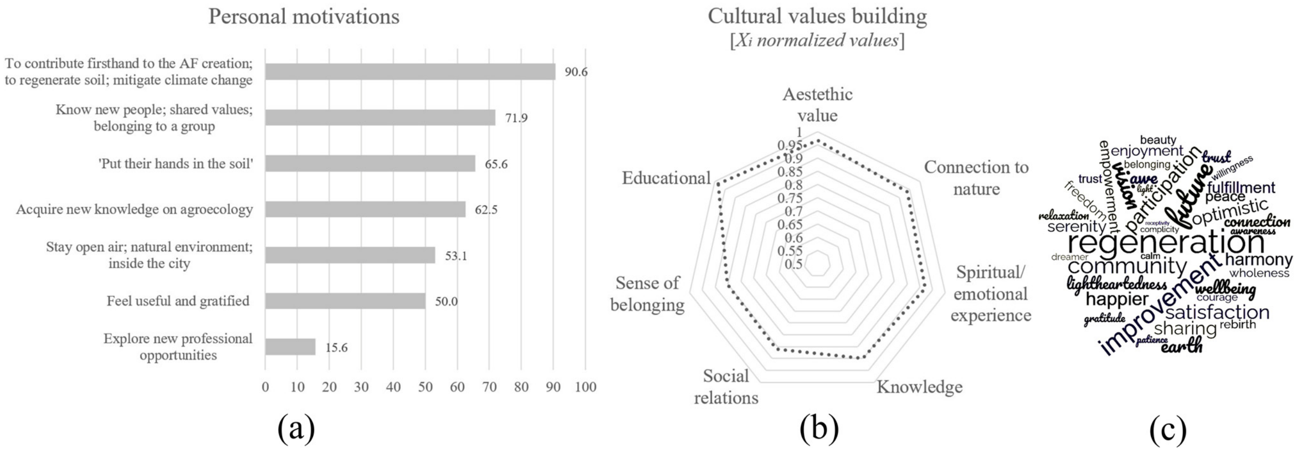

Figure 5. (**a**) Personal motivations analysis results. (**b**) Value-building analysis results. (**c**) World cloud representing the states of mind related to AF experiences.

To better assess the complexity of CESs, a multiple-choice question detected the type of personal and perceptive spontaneous interactions with the AF project. The following actions are performed: walk between the lines (84.4%); observe the landscape (75%); observe the fauna (50%); sit or lie down and close their eyes (37.5%); listen to what is happening around them (59.4%); smell the aromas emanating from the AF project (56.3%); put their hands in the earth in search of a lost contact (37.5%); and touch the plants (68.8%). Several respondents enter a spiritual, exploratory and self-awareness dimension through prayer (9.4%), meditation (25%), reading (12.5%), drawing (3.1%), writing (6.3%), photography (37.5%) and video filming (15.6%), as well as sharing these experiences on social networks (12.5%) or through conversations with neighbouring inhabitants (15.6%). The word cloud summarises the words best representing the respondents' states of mind related to AF experiences (Figure 5c). All this information helped in linking the volunteers' interactions with AF to CESs, referring to nonmonetary methods [144]. Nevertheless, a question was included attempting to probe the volunteers' perceptions of CES economic issues. Answers confirmed, on one hand, the difficulty in placing a value in monetary terms; on the other hand, the belief that the CESs generated for free by agroforestry are sufficiently "paid back" (75% are unable to quantify the economic value of such services and believe that more financial resources, both public and private, should be allocated to AF management; 9.4% would be willing to invest personal economic resources on the AF care and management activities).

Sociographic properties analysis (Figure 6) returns a rather interesting picture: 62.5% females; 40.6% of total respondent are in the 25–35 age range, 25% are in the 36–45 age range (Figure 6a). In total, 71.9% live in Milan city (mainly, municipalities 4 (34.8%) and 5 (21.7%), which are the closest to the study area) (Figure 6c). Overall, 84.4% of surveyed people travel to the AF by bicycle as their first choice, and surface public transports (46.2%) and car (30.8%) prevails as their second choice, taking between 5 and 30 min in 62.5% of first choice cases (Figure 6d,e). Such data provide useful insights with respect to future attempts at monetary quantification. The level of education is high: master's degree (43.8%), high school diploma (25%), bachelor's degree (25%), postgraduate degree (12.5%), and PhD (3.1%). With respect to employment, there are many students (31.3%), freelancers (21.9%), employees (15.6%) and some teachers (9.4%) (Figure 6b).

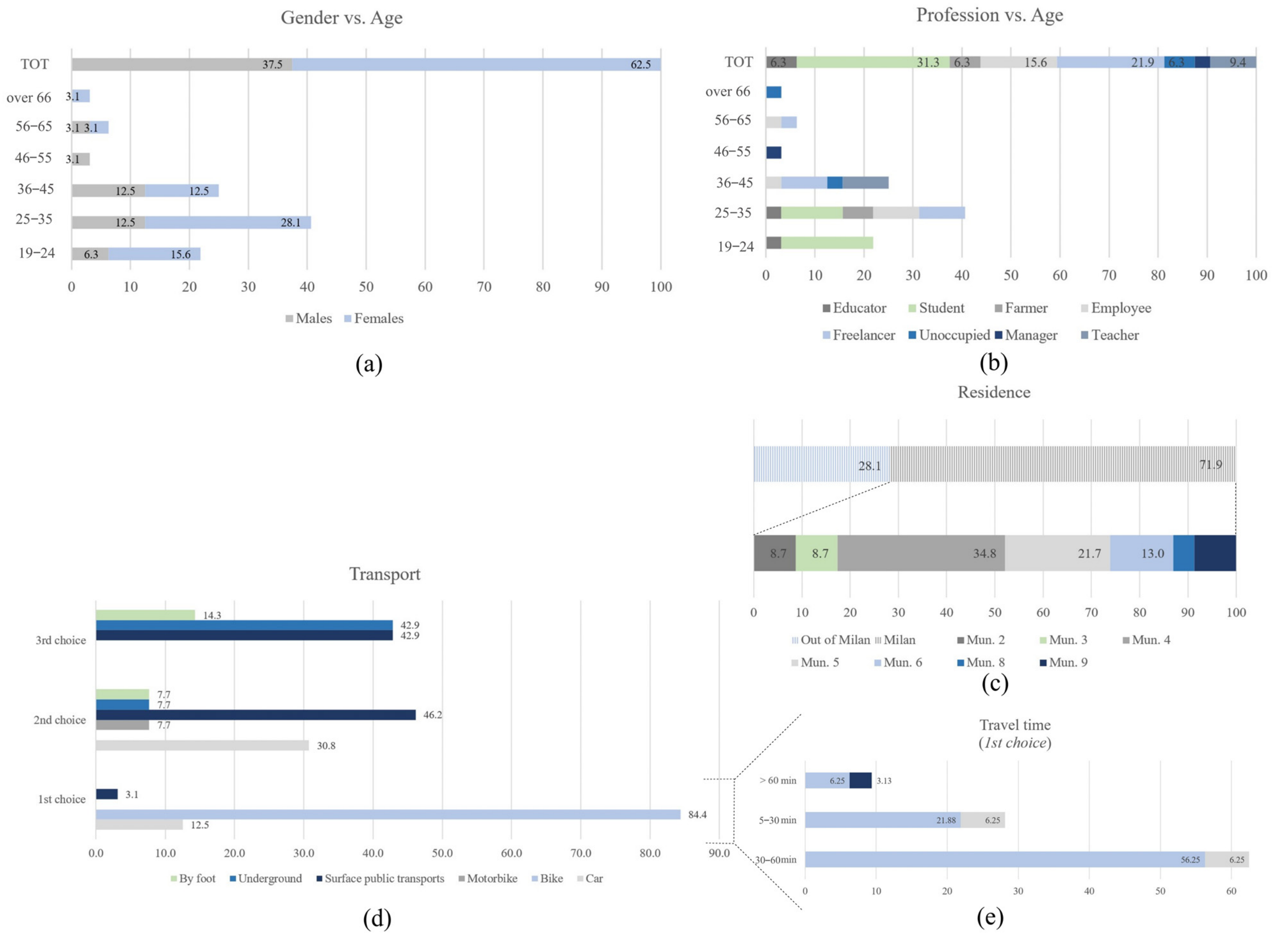

Figure 6. Sociographic properties of surveyed AF volunteers. (**a**) Gender versus age. (**b**) Professions versus age. (**c**) Place of residence. (**d**) Means of transport used to travel to the AF project. (**e**) Average travel time to arrive at the AF project.

3.2.3. Cultural Surveys Results Discussion

The analytical results presented in this study should be interpreted as useful suggestions for orienting further deeper analyses, through wider data sets and diversified human community targets, to improve their representativeness and informative potential. Nonetheless, these preliminary results were a useful starting point for orienting and setting our analytical methodological framework. They gave us interesting suggestions on the potential links between AF and CESs, especially by highlighting the awareness on these links by the surveyed volunteers. Indeed, results suggested how processes of existential reconnection with the natural element have been established among the involved volunteers' community thanks to the AF project. Indeed, they associated feelings of serenity and psychophysical well-being to the AF project, which were both linked to physical features of the AF and AF management activities. A sense of fulfilment, interest and personal satisfaction is detected in the AF volunteers' human community subset. Also, a rediscovered aesthetic quality of places is acknowledged. Among the surveyed community, forms of collective reidentification with the local patrimonial deposits [145] can be recognised (see Section 3.2.2). Diachronic changes in volunteers' interactions with the study area reflect an ongoing cultural change. Taken together, these pilot analyses strengthened our hypotheses on the role of the AF initiatives in reactivating "awareness, knowledge and commitment to the care of the place" and in "reconstructing propensities to produce, to inhabit, to consume in relational, solidarity and community forms" [145].

Such results support the hypothesis that the AF, if intended as a regenerative land management tool [78], can offer valuable perspectives, restoring agroecosystems to higher levels of complexity and environmental stability whilst promoting processes of territorial cultural regeneration. This fosters our initial statement that AF contributions should be recognised as pivotal services for the social and economic sustainability of urban human communities. Such experiences are tightly coherent with a peri-urban development model aspiring to recreate a network of mutual benefits by reconnecting the functionalities of urban and agricultural compartments [72,75,76].

3.3. Ecosystem Services Assessment: Preliminary Results

Figure 7a shows the potential ES matrix, in which we qualitatively assessed the contribution of each CS and TS land use category towards the provisioning of each ES type. It shows significant positive TS contribution (Figure 7a).

Potential support ES supply by NAT components increases (CS: 52%; TS: 96%). This is a significant change, and it is due to the spread of landscape features of higher quality, which play a pivotal role for the provision of diversified habitats and biodiversity support [72,75,76]. HYD components, absent in CS, also contribute to support ES provisioning. AGR-support ES supply also increases (CS: 43%; TS: 55%). This is due to the shift from fallow fields (with predominant allochthonous species) to permanent polyphytic grasslands, diversified crop fields and highly diversified in-field agroforestry systems (see Sections 3.1.2 and 3.1.3).

Potential provisioning ES supply by NAT components improves (CS: 29%; TS: 37%). Changes are mainly due to product diversification enabled by new woody areas, which also have phytoremediation purposes (new outputs: wood, fibre, others). Also, AGR values improve (CS: 46%; TS: 55%). Main changes are linked to product diversification enabled by agroforestry systems (food, fibre, wood, genetic resources), diversified crop fields, and feed permanent polyphitic grasslands, substituting uncultivated fields [95].

Potential regulating ES supply by NAT components significantly increases (CS: 44%; TS: 80%). The main contributions are due to the floristic and vegetational recovery, diversification and structuring of areal and linear landscape features (woody areas and strips, hedgerows system) [64,72]. Important regulating ESs are also supplied by newly inserted HYD components. AGR values slightly increase (CS: 39%; TS: 54%). Main contributions are due to the insertion of highly diversified productive in-field agroforestry systems, which provide different regulating functions [64,95].

Potential cultural ES supply by NAT components ameliorates (CS: 33%; TS: 59%). This is mostly due to the recovery of landscape identity (traditional diversified Po Plain rural landscape): new green infrastructures rehabilitate the sense of place and become comfortable, healthy green refuge areas for citizens [32]. AGR cultural ES supply rises (CS: 62%; TS: 83%). Improvements are linked to the spread of innovative agroforestry management models, where didactical, knowledge sharing, recreative and participative agroecological activities reactivate cultural functions and processes (see Sections 3.2.2 and 3.2.3) [78,96].

Potential total ES supply (ES_{tot}) similarly improves for NAT (CS: 39%; TS: 68%; main contribution is given by support and regulating ESs) and AGR components (CS: 48%; TS: 61%; main contribution is given by cultural and regulating ESs). This highlights the important role that agroecological participative approaches play in the overall system. ANT component ES_{tot} values remain stable, as TS forecasted, with no interventions on public green urban areas, such as urban parks.

Basically, these results highlight:

1. a leading role played by support ESs (both for NAT and AGR sub-systems);
2. the high weight of regulating ESs for the NAT sub-system, with AGR agroforestry patches significantly contributing too;
3. the high weight of cultural ESs for the AGR sub-system (among which the cultural analyses are mostly being led).

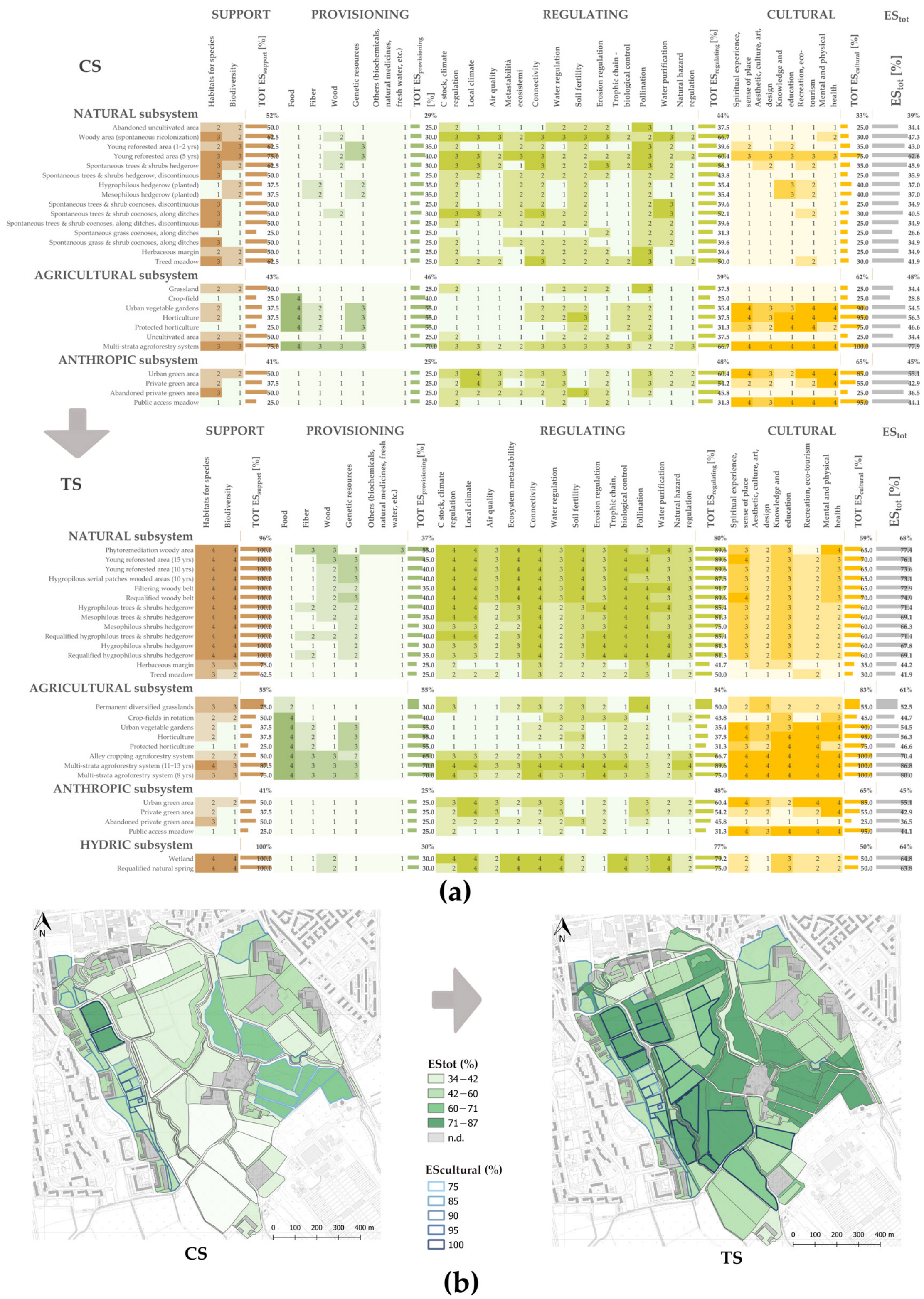

Figure 7. (**a**) The potential ecosystem services matrix for CS and TS, with ES values ranging from 1 to 4. (**b**) The spatialization of total ES supply (ES_{tot}) results for CS and TS, highlighting the role of cultural ecosystem services contributions (blue-circled patches).

The spatialization of the total ES supply (ES_{tot}) results on vector patch types (Figure 7b) highlights the different spatial distribution of the potential ES supply, passing from CS to TS. In CS, ES provisioning is mainly condensed into pre-existing young woody patches and into the two AF patches. Here, participative and didactical activities also raise the contribution of cultural ESs to ES_{tot} (blue-circled patches supply more than 75% of the maximum cultural ES scoring). In TS, high values of ES_{tot} are widely spread across the study area: highest values always occur on woody and productive agroforestry patches. These results give a clear spatial–qualitative outline of the multispectra benefits that could potentially be delivered by implementing a diversified agroforestry management model inspired by TS. This spatial analysis also suggests the informative potential that could be displayed by upscaling this methodology to similar peri-urban contexts.

4. Conclusions

With our study, we outlined some newly adapted analytical tools for answering to the need for integrated, transdisciplinary ES assessment approaches, where multi-scale ecological data and cultural survey data are matched together. This is intended to help in fitting the peculiarities of a specific metropolitan context. Here, we presented the first results regarding the building of a useful and replicable assessment tool that could meet policy requirements and local stakeholders needs. Indeed, it could orient the strategic ecological and cultural management of peri-urban belts in the sustainable metropolitan development strategy framework.

The first application in this paper of this methodological framework revealed it to be a workable tool for outlining the following: 1. the current impairment level of ecological functions among the extra-local and local-scale peri-urban landscape system under study, showcasing how the spread of an agroforestry model (as foreseen by the MPV vision) would positively improve the agro-eco-mosaic structuring and diversification levels, and its resulting ecological functions and ES delivering capacity; and 2. the concurrent and synergistic cultural relevance of the ESs provided by the agroforestry participative practices in terms of meaning, aesthetic–perceptual value, knowledge and sense of place.

Working on different spatial and temporal scales was a useful informative strategy for our methodological settings and purposes. Particularly, the featuring of extra-local scale was useful for highlighting the potential positive influence that the study area could bring to the overall balance and metastability of the peri-urban landscape system thanks to the agroforestry management. At the local scale, the obtained results on TS were interpreted as positively influencing: the agroecosystem diversification; micro-habitat provisioning; species movements and genetic exchanges across the area; and the facilitation of more sensitive species mobility. These traits, taken together, contribute to the lowering of sink behaviours, which are overrepresented in CS. TS also showed an influence on the improvement of biotic and abiotic resource fluxes across the local landscape. Indeed, connectivity and circuitry functions are significantly supported by both restored out-field landscape features and productive in-field agroforestry systems. These comparative results (CS versus TS) match the territorial needs brought out by extra-local-scale analysis. On the cultural side, results on the first human community target (the AF volunteers) testified for the ongoing processes of resemantization and rehabilitation of the cultural landscape. They provided useful suggestions on the role that can be played by shared land care and management practices, towards the reconnection of urban communities to the ecosystems they belong to.

Informed by these socio-ecological functions assessment, the preliminary qualitative study on potential ES supply showed: 1. a leading role played by support and regulating ESs (especially in TS); and 2. a high relative weight of cultural ESs for the agricultural system (TS) thanks to the expansion of the agroecological participative approaches linked to AF practices. Indeed, they positively raised the total ES supply values across the studied peri-urban area, reactivating the sense of place values. The spatialization of ESs results highlighted the role of woody and productive agroforestry patches in supporting diffused ES delivering across the peri-urban agricultural landscape.

Briefly, this study gives a multiperspective outline on how abandoned and degraded peri-urban agricultural areas can become generators of services, supporting their internal but also external system (e.g., the Vettabbia Valley landscape system, Milan southern suburbs and Milan Metropolitan City) [72,75,76,78].

To fully develop the trans-disciplinary methodological framework presented in this paper, the following steps are needed: 1. the identification of a common scoring system to be quantitatively informed by the analytical results on socio-ecological functions, based on a land-use-matrix approach, to reach the final aim of identifying a synthetic, spatially explicit, ES indicator; and 2. the integration, into this framework, of results coming from other ES assessment studies, allowing us to quantitatively inform a wider set of ESs, deepening the informative potential of the methodology. This latter point would positively broaden the impact of our approach, which is distinguished by its attempt to include relevant ecological and socio-cultural information into the ES assessment process, specifically fitting case study peculiarities.

Supplementary Materials: The following supporting information can be downloaded at: https://www.mdpi.com/article/10.3390/su151411020/s1, Table S1: Extra-local-scale landscape eco-mosaic patches entry-level data; Table S2: Local-scale landscape eco-mosaic CS and TS patches entry-level data.

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Data Availability Statement: The datasets generated during and/or analysed during the current study are available from the corresponding author upon reasonable request.

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

Appendix A

Table A1. The local- and extra-local-scale-selected landscape ecology indices: patch metrics (landscape composition main traits); physiognomic–structural indices (diversity at landscape level), considering its patch shape complexity components and patch type heterogeneity and dominance; structural–functional indices (landscape level functions based on landscape structural traits: connectivity, circuitry, permeability, metastability (BTC)).

	DESCR	u.m.	Equation	Scale	References
Patch metrics	Area: total area of each i-land use category patch (A_i)	Ha	$A_i = \sum a_{iy}$ a_{iy} = each *y*-patch area belonging to each *i*-land use category		
	Perimeter: perimeter of each i-land use category patch (P_i)	M	$P_i = \sum p_{iy}$ p_{iy} = each *y*-patch perimeter belonging to each *i*-land use category		
	Number of patches for each i-land use category (NP_i)	n.		Extra-local; Local	[102,119]

Table A1. *Cont.*

	DESCR	u.m.	Equation	Scale	References
Patch metrics	Medium patch size (*MPS*)	Ha	$MPS = \frac{\sum_{i=1}^{n} A_i/N_i}{LU}$ N_i = no. of patches for each land use category LU = no. of land use categories	Extra-local; Local	[107,108,119]
	Matrix (*MTX*)	%	$MTX = \frac{\sum_{i=1}^{n} A_i \times 100}{A_{tot}}$ A_{tot} = total area	Extra-local; Local	[102,108]
Physiognomic–structural indices	Shape index (*SI*)	M	$SI = \frac{0.282 \times P_i \times 10}{\sqrt{A_i}}$	Extra-local; Local	[108,119,146]
	Diversity_1a/tot (*DIV_1a*)		$DIV_{1a} = -\sum_{i=1}^{n} \frac{A_i}{A_{tot}} \times \ln \frac{A_i}{A_{tot}}$	Extra-local; Local	[102,108,147,148]
	Diversity_1b/landscape element (*DIV_1b*)		$DIV_{1b} = -\sum_{i=1}^{n} \frac{A_i}{A_y} \times \ln \frac{A_i}{A_y}$ A_y = total area of each landscape system (natural, agricultural and anthropic)	Local	[102,108,147] (modified by authors)
	Dominance (*DOM_1a*)		$DOM_1 = \ln S + \sum_{i=1}^{n} \frac{A_i}{A_{tot}} \times \ln \frac{A_i}{A_{tot}}$	Local	[102,108,147]
	Landscape Structural Diversity (*LSD_1a*)		$LSD_1 = DIV_{1a} \times (3 + DOM_{1a})$	Local	[149]
Structural–functional indices	Connectivity (*CON*)		$CON = \frac{L}{[3 \times (N-2)]}$ L = no. of links N = no. of nodes	Local	[101,103,150,151]
	Weighted connectivity (*WCON*)		$WCON = \frac{\sum_{i=1}^{5} L_i \times W_i}{[3 \times (N-2)]}$ L_i = no. of links for each Ecological Quality Class (EQC_i = [1–5]) W_i = EQC_i weight: $W_i = \frac{EQC_i}{EQC_{max}}$	Local	[101,103,150,151] (modified by authors)
	Circuitry (*CIR*)		$CIR = \frac{(L-N+1)}{[2 \times (N-5)]}$	Local	[101,103,150,151]
	Weighted circuitry (*WCIR*)		$WCIR = \frac{[(\sum_{i=1}^{5} L_i \times W_i) - N + 1)]}{[2 \times (N-5)]}$ L_i = no. of links for each Ecological Quality Class (EQC_i = [1–5]) W_i = EQC_i weight (as above)	Local	[101,103,150,151] (modified by authors)
	Permeability coefficient (K_i)	%		Extra-local; Local	[103,152]
	Permeable surface (*PERM*)	Ha	$PERM = \sum K_i \times A_i$	Extra-local; Local	[103,152]
	Specific Biological Territorial Capacity (BTC_i)	Mcal/ha/ys		Extra-local	[14,104,112]
	Areal Biological Territorial Capacity (*BTC_ha*)	Mcal/ys	$BTC = \sum BTC_i \times A_i$	Extra-local	[14,104,112]

Appendix B

Table A2. Qualitative-quantitative census on human community components.

Number of Initiatives	Typology	Organisers	Involved Local Stakeholders	Social Media	Sentiment Analysis (Interaction Related to Social Network Communication)	Number of People	Fundings and Economics	Year/Period	Interaction with the Agroforestry Ecosystem (Direct/Indirect)
15	Public planting	Soulfood Forest-farms/CasciNet	Municipality of Milan, University of Milan	Facebook, Instagram	Comments to posts Reactions to posts and events Resharing Publishing related stories and images	1000 citizens	Public fundings, private fundings	2019 2022	Direct
4	Agroecology and agroforestry workshop	Soulfood Forest-farms/CasciNet	Citizens, farmers	Facebook, Instagram	Comments to posts Reactions to posts and events Resharing Publishing related stories and images	50	Public fundings, private fundings	2019 2022	Direct
3	In-field training course	Soulfood Forest-farms/CasciNet/ University of Milan	University of Milan, farmers, university students	Facebook, Instagram	Comments to posts Reactions to posts and events Resharing Publishing related stories and images	50 students, 3 teachers	Public fundings	2021 2022 2023	Direct
3	Temporary art installation	Soulfood Forest-farms/CasciNet/ Accademia di Brera	Art academy students	Facebook, Instagram	Comments to posts Reactions to posts and events Resharing Publishing related stories and images	30 students, 2 teachers	Public fundings	2021 2022	Indirect
5	Public performance	Soulfood Forest-farsm/CasciNet/ Terzo Paesaggio	Citizens, students, local authorities	Facebook, Instagram	Comments to posts Reactions to posts and events Resharing Publishing related stories and images	200 citizens	Public fundings	2020 2021 2022	2 direct, 3 indirect

Table A2. *Cont.*

Number of Initiatives	Typology	Organisers	Involved Local Stakeholders	Social Media	Sentiment Analysis (Interaction Related to Social Network Communication)	Number of People	Fundings and Economics	Year/Period	Interaction with the Agroforestry Ecosystem (Direct/Indirect)
1	Festival	Soulfood Forestfarms	Citizens, students, local authorities	Facebook, Instagram	Comments to posts Reactions to posts and events Resharing Publishing related stories and images	200 citizens	Public fundings	2022	Indirect
2	Talk	Soulfood Forestfarms	Citizens. students, local authorities	Facebook, Instagram	Comments to posts Reactions to posts and events Resharing Publishing related stories and images	100 citizens	Public fundings	2021 2022	Indirect
4	Public walk	Soulfood Forest-farms/CasciNet/ Terzo Paesaggio	Citizens, students, local authorities	Facebook, Instagram	Comments to posts Reactions to posts and events Resharing Publishing related stories and images	200 citizens	Public fundings	2020 2021 2022	Direct
1	Summer camp	Soulfood Forestfarms/ Forme Tentative/ Terzo Paesaggio/ Farini Work	Local school, primary school students	Facebook, Instagram	Comments to posts Reactions to posts and events Resharing Publishing related stories and images	20 students	Public fundings	2022	Direct
2	Architecture training course	Forme Tentative/ Terzo Paesaggio/ Politecnico di Milano	University students	Facebook, Instagram	Comments to posts Reactions to posts and events Resharing Publishing related stories and images	50 students, 4 teachers	Private fundings	2021 2022	Direct

References

1. European Commission. *Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions—EU Biodiversity Strategy for 2030—Bringing Nature Back into Our Lives*; *20.5.2020 COM (2020) 380 Final*; European Commission: Brussels, Belgium, 2020.
2. IPCC. *Climate Change and Land, An IPCC Special Report on Climatechange, Desertification, Land Degradation, Sustainable Land Management, Food Security, and Greenhouse Gas Fluxes in Terrestrial Ecosystems*; IPCC: Geneva, Switzerland, 2019.
3. MEA. *Ecosystems and Human Well-Being—Synthesis, Millennium Ecosystem Assessment*; Island Press: Washington, DC, USA, 2005; Volume A/RES/70/1.
4. UK NEA. *The Natural Choice: Securing the Value of Nature*; TSO: Herefordshire, UK, 2011; Volume CM 8082.
5. European Commission. *Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, Green Infrastructure (GI)- Enhancing Europe's Natural Capital {SWD(2013) 155 Final}*; *COM(2013) 249 Final*; European Commission: Brussels, Belgium, 2013.
6. Balbi, S.; Giupponi, C. Agent-based modelling of socio-ecosystems: A methodology for the analysis of adaptation to climate change. *IJATS* **2010**, *2*, 17–38. [CrossRef]
7. European Commission. *Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee and the Committee of the Regions—The European Green Deal*; *11.12.2019 COM(2019) 640 Final*; European Commission: Brussels, Belgium, 2019.
8. General, A. *United Nations Transforming Our World: The 2030 Agenda for Sustainable Development, Resolution Adopted by the General Assembly on 25 September 2015*; *A/RES/70/1*; Division for Sustainable Development Goals: New York, NY, USA, 2015.
9. United Nations. *Report of the Conference of the Parties Serving as the Meeting of the Parties to the Paris Agreement on Its Third Session, Held in Glasgow from 31 October to 13 November 2021. 2022, FCCC/PA/CMA/2021/10/Add.1*; United Nations: New York, NY, USA, 2022.
10. Bisogni, L.; Colucci, A.; Gibelli, G. Services, Values and Functions of Peri-Urban Areas in a Nexus Approach. In *Peri-Urban Areas and Food-Energy-Water Nexus*; Colucci, A., Magoni, M., Menoni, S., Eds.; Springer: Cham, Switzerland, 2017.
11. Gibelli, M.G.; Pinto, F. Environmental and ecological issues. In *European Cities Dynamics, Insights on Outskirts*; Franzén, M., Halleux, J.-M., Eds.; Cost Action 10; METL/PUCA; Springer: Cham, Switzerland, 2004.
12. Contin, A. *Metropolitan Landscapes, towards a Shared Construction of the Resilient City of the Future*; Springer: Cham, Switzerland, 2021; p. XVI, 191.
13. Gibelli, M.G.; Santolini, R. Transetto per il rilievo della variabilità paesistica. In *Il Paesaggio Delle Frange Urbane*; Gibelli, M.G., Ed.; Franco Angeli: Milano, Italy, 2003.
14. Ingegnoli, V. The study of vegetation for a diagnostical evaluation of agricultural landscapes, some examples from Lombardy. *Ann. Di Bot. Nuova Ser.* **2006**, *6*, 111–120.
15. Loreau, M.; de Mazancourt, C. Biodiversity and ecosystem stability: A synthesis of underlying mechanisms. *Ecol. Lett.* **2013**, *16*, 106–115. [CrossRef]
16. Chytry, M.; Jarosik, V.; Pyšek, P.; Hájek, O.; Knollova, I.; Tichý, L.; Danihelka, J. Separating habitat invasibility by alien plants from the actual level of invasion. *Ecology* **2008**, *89*, 1541–1553. [CrossRef] [PubMed]
17. Hooper, D.U.; Chapin Iii, F.S.; Ewel, J.J.; Hector, A.; Inchausti, P.; Lavorel, S.; Lawton, J.H.; Lodge, D.M.; Loreau, M.; Naeem, S.; et al. Effects of biodiversity on ecosystem functioning: A consensus of current knowledge. *Ecol. Monogr.* **2005**, *75*, 3–35. [CrossRef]
18. Rebele, F. Urban Ecology and Special Features of Urban Ecosystems. *Glob. Ecol. Biogeogr. Lett.* **1994**, *4*, 173–187. [CrossRef]
19. Honnay, O.; Piessens, K.; Van Landuyt, W.; Hermy, M.; Gulinck, H. Satellite based land use and landscape complexity indices as predictors for regional plant species diversity. *Landsc. Urban Plan.* **2003**, *63*, 241–250. [CrossRef]
20. Godefroid, S.; Koedam, N. Identifying Indicator Plant Species of Habitat Quality and Invasibility as a Guide for Peri-Urban Forest Management. *Biodivers. Conserv.* **2003**, *12*, 1699. [CrossRef]
21. Kowarik, I. Some Responses of Flora and Vegetation to Urbanization in Central Europe. In *Plants and Plant Communities in the Urban Environment*; SPB Academic Publishing: Amsterdam, The Netherlands, 1990; pp. 45–75.
22. McKinney, M.L.; Lockwood, J.L. Biotic homogenization: A few winners replacing many losers in the next mass extinction. *Trends Ecol. Evol.* **1999**, *14*, 450–453. [CrossRef]
23. Gascuel-Odoux, C.; Massa, F.; Durand, P.; Merot, P.; Troccaz, O.; Baudry, J.; Thenail, C. Framework and Tools for Agricultural Landscape Assessment Relating to Water Quality Protection. *Environ. Manag.* **2009**, *43*, 921–935. [CrossRef]
24. Gibelli, M.G.; Dosi, V.M.; Selva, C. From "Landscape DNA" to Green Infrastructures Planning. In *Metropolitan Landscapes: Towards a Shared Construction of the Resilient City of the Future*; Contin, A., Ed.; Springer: Cham, Switzerland, 2021; pp. 121–137.
25. Berghöfer, A.; Mader, A.; Patrickson, S.; Calcaterra, E.; Smit, J.; Blignaut, J.; de Wit, M.; Van Zyl, H. *TEEB Manual for Cities: Ecosystem Services in Urban Management*; TEEB: Bishop, CA, USA, 2011.
26. Gliessman, S.R. *Agroecology: The Ecology of Sustainable Food Systems*, 3rd ed.; CRC Press, Taylor & Francis Group: Abingdon, UK, 2015; IDBN: 978-1-4987-2846-1.
27. Jones, S.; Somper, C. The role of green infrastructure in climate change adaptation in London. *Geogr. J.* **2014**, *180*, 191–196. [CrossRef]
28. Opdam, P.; Wascher, D. Climate change meets habitat fragmentation: Linking landscape and biogeographical scale levels in research and conservation. *Biol. Conserv.* **2004**, *117*, 285–297. [CrossRef]

29. Pamukcu-Albers, P.; Ugolini, F.; La Rosa, D.; Grădinaru, S.R.; Azevedo, J.C.; Wu, J. Building green infrastructure to enhance urban resilience to climate change and pandemics. *Landsc. Ecol.* **2021**, *36*, 665–673. [CrossRef]
30. Catalano, C. *Urban Services to Ecosystems: Green Infrastructure Benefits from the Landscale to the Urban Scale*; Springer: Cham, Switzerland, 2021.
31. Castiglioni, B. *Paesaggio e Società. Una Prospettiva Geografica*; Carocci: Roma, Italy, 2022.
32. Magnaghi, A. *Il Principio Territoriale*; Bollati Boringhieri: Torino, Italy, 2020.
33. European Commission. *Towards an EU Research and Innovation Policy Agenda for Nature-Based Solutions & Re-Naturing cities: Final Report of the Horizon 2020 Expert Group on 'Nature-Based Solutions and Re-Naturing Cities' (Full Version)*; Publications Office, Directorate-General for Research and Innovation: Brussels, Belgium, 2015. Available online: https://data.europa.eu/doi/10.2777/479582 (accessed on 27 April 2023).
34. Kabisch, N.; Korn, H.; Stadler, J.; Bonn, A. *Nature-Based Solutions to Climate Change Adaptation in Urban Areas, Linkages between Science, Policy and Practice*; Springer: Cham, Switzerland, 2017; p. XI, 342.
35. Kremen, C.; Merenlender, A.M. Landscapes that work for biodiversity and people. *Science* **2018**, *362*, eaau6020. [CrossRef]
36. Lafortezza, R.; Chen, J.; van den Bosch, C.K.; Randrup, T.B. Nature-based solutions for resilient landscapes and cities. *Environ. Res.* **2018**, *165*, 431–441. [CrossRef] [PubMed]
37. Mahmoud, I.H.; Morello, E.; Lemes de Oliveira, F.; Geneletti, D. *Nature-Based Solutions for Sustainable Urban Planning—Greening Cities, Shaping Cities*; Springer: Cham, Switzerland, 2022; p. XX, 232.
38. Miralles-Wilhelm, F.; Iseman, T. *Nature-Based Solutions in Agriculture—The Case and Pathway for Adoption*; FAO: Rome, Italy, 2021. [CrossRef]
39. Hernández-Morcillo, M.; Burgess, P.; Mirck, J.; Pantera, A.; Plieninger, T. Scanning agroforestry-based solutions for climate change mitigation and adaptation in Europe. *Environ. Sci. Policy* **2018**, *80*, 44–52. [CrossRef]
40. Lovell, S.T.; Stanek, E.; Revord, R. Agroforestry Integration and Multifunctional Landscape Planning for Enhanced Ecosystem Services from Treed Habitats. In *Agroforestry and Ecosystem Services*; Udawatta, R.P., Jose, S., Eds.; Springer: Cham, Switzerland, 2021; pp. 451–476.
41. Montagnini, F.; del Fierro, S. Functions of Agroforestry Systems as Biodiversity Islands in Productive Landscapes. In *Biodiversity Islands: Strategies for Conservation in Human-Dominated Environments*; Montagnini, F., Ed.; Springer: Cham, Switzerland, 2022; pp. 89–116.
42. Udawatta, R.P.; Jose, S. *Agroforestry and Ecosystem Services*; Springer: Cham, Switzerland, 2021; p. XI, 510.
43. Jackson, L.E.; Pascual, U.; Hodgkin, T. Utilizing and conserving agrobiodiversity in agricultural landscapes. *Agric. Ecosyst. Environ.* **2007**, *121*, 196–210. [CrossRef]
44. Bouwma, I.; Schleyer, C.; Primmer, E.; Winkler, K.J.; Berry, P.; Young, J.; Carmen, E.; Špulerová, J.; Bezák, P.; Preda, E.; et al. Adoption of the ecosystem services concept in EU policies. *Ecosyst. Serv.* **2018**, *29*, 213–222. [CrossRef]
45. Kremen, C.; Ostfeld, R.S. A call to ecologists: Measuring, analyzing, and managing ecosystem services. *Front. Ecol. Environ.* **2005**, *3*, 540–548. [CrossRef]
46. Beillouin, D.; Ben-Ari, T.; Malézieux, E.; Seufert, V.; Makowski, D. Positive but variable effects of crop diversification on biodiversity and ecosystem services. *Glob. Chang. Biol.* **2021**, *27*, 4697–4710. [CrossRef]
47. Staton, T.; Breeze, T.D.; Walters, R.J.; Smith, J.; Girling, R.D. Productivity, biodiversity trade-offs, and farm income in an agroforestry versus an arable system. *Ecol. Econ.* **2022**, *191*, 107214. [CrossRef]
48. Hirons, M.; Comberti, C.; Dunford, R. Valuing Cultural Ecosystem Services. *Annu. Rev. Environ. Resour.* **2016**, *41*, 545–574. [CrossRef]
49. Falkowski, T.B.; Diemont, S.A.W. Cultural Ecosystem Services in Agroforests. In *Agroforestry and Ecosystem Services*; Udawatta, R.P., Jose, S., Eds.; Springer: Cham, Switzerland, 2021; pp. 361–387.
50. Chan, K.M.A.; Satterfield, T.; Goldstein, J. Rethinking ecosystem services to better address and navigate cultural values. *Ecol. Econ.* **2012**, *74*, 18. [CrossRef]
51. Kenter, J.O.; Bryce, R.; Christie, M.; Cooper, N.; Hockley, N.; Irvine, K.N.; Fazey, I.; O'Brein, L.; Orchard-Webb, J.; Ravenscroft, N.; et al. Shared values and deliberative valuation: Future directions. *Ecosyst. Serv.* **2016**, *21*, 358–371. [CrossRef]
52. Ernstson, H.; Sörlin, S. Ecosystem services as technology of globalization: On articulating values in urban nature. *Ecol. Econ.* **2013**, *86*, 274–284. [CrossRef]
53. Norgaard, R.B. Ecosystem services: From eye-opening metaphor to complexity blinder. *Ecol. Econ.* **2010**, *69*, 1219–1227. [CrossRef]
54. Paletto, A.; De Meo, I.; Morelli, S. Sistemi di pagamento per i servizi ecosistemici (PES): Analisi della letteratura nazionale e internazionale. *L'Italia For. E Mont. Ital. J. For. Mt. Environ.* **2020**, *75*, 281–314. [CrossRef]
55. Díaz, S.; Pascual, U.; Stenseke, M.; Martín-López, B.; Watson, R.T.; Molnár, Z.S.; Hill, R.O.; Chan, K.a.M.A.; Baste, I.v.A.; Brauman, K.a.A.; et al. Assessing nature's contributions to people. Recognizing culture, and diverse sources of knowledge, can improve assessments. *Science* **2018**, *359*, 270–272. [CrossRef] [PubMed]
56. Díaz, S.; Demissew, S.; Carabias, J.; Joly, C.; Lonsdale, M.; Ash, N.; Larigauderie, A.; Ram Adhikari, J.; Arico, S.; Báldi, A.; et al. The IPBES Conceptual Framework—connecting nature and people. *Curr. Opin. Environ. Sustain.* **2015**, *14*, 1–16. [CrossRef]
57. Bagstad, K.J.; Semmens, D.J.; Waage, S.; Winthrop, R. A comparative assessment of decision-support tools for ecosystem services quantification and valuation. *Ecosyst. Serv.* **2013**, *5*, 27–39. [CrossRef]

58. Busch, M.; La Notte, A.; Laporte, V.; Erhard, M. Potentials of quantitative and qualitative approaches to assessing ecosystem services. *Ecol. Indic.* **2012**, *21*, 89–103. [CrossRef]
59. Haase, D.; Larondelle, N.; Andersson, E.; Artmann, M.; Borgström, S.; Breuste, J.; Gomez-Baggethun, E.; Gren, Å.; Hamstead, Z.; Hansen, R.; et al. A Quantitative Review of Urban Ecosystem Service Assessments: Concepts, Models, and Implementation. *Ambio* **2014**, *43*, 413–433. [CrossRef]
60. Kasparinskis, R.; Ruskule, A.; Vinogradovs, I.; Villoslada, M. *The Guidebook on "The Introduction to the Ecosystem Service Framework and Its Application in Integrated Planning*; University of Latvia, Faculty of Geography and Earth Sciences: Riga, Latvia, 2018.
61. Vihervaara, P.; Viinikka, A.; Brander, L.M.; Santos-Martín, F.; Poikolainen, L.; Nedkov, S. Methodological interlinkages for mapping ecosystem services—from data to analysis and decision-support. *One Ecosyst.* **2019**. [CrossRef]
62. Schmidt, K.; Martín-López, B.; Phillips, P.M.; Julius, E.; Makan, N.; Walz, A. Key landscape features in the provision of ecosystem services: Insights for management. *Land Use Policy* **2019**, *82*, 353–366. [CrossRef]
63. Sieber, J.; Pons, M. Assessment of Urban Ecosystem Services using Ecosystem Services Reviews and GIS-based Tools. *Procedia Eng.* **2015**, *115*, 53–60. [CrossRef]
64. Zanzi, A.; Andreotti, F.; Vaglia, V.; Alali, S.; Orlando, F.; Bocchi, S. Forecasting Agroforestry Ecosystem Services Provision in Urban Regeneration Projects: Experiences and Perspectives from Milan. *Sustainability* **2021**, *13*, 2434. [CrossRef]
65. Englund, O.; Berndes, G.; Cederberg, C. How to analyse ecosystem services in landscapes—A systematic review. *Ecol. Indic.* **2017**, *73*, 492–504. [CrossRef]
66. Satz, D.; Gould, R.K.; Chan, K.M.A.; Guerry, A.; Norton, B.; Satterfield, T.; Halpern, B.S.; Levine, J.; Woodside, U.; Hannahs, N.; et al. Challenges of Incorporating Cultural Ecosystem Services into Environmental Assessment. *Ambio* **2013**, *42*, 675–684. [CrossRef]
67. Semeraro, T.; Radicchio, B.; Medagli, P.; Arzeni, S.; Turco, A.; Geneletti, D. Integration of Ecosystem Services in Strategic Environmental Assessment of a Peri-Urban Development Plan. *Sustainability* **2021**, *13*, 122. [CrossRef]
68. Seppelt, R.; Dormann, C.F.; Eppink, F.V.; Lautenbach, S.; Schmidt, S. A quantitative review of ecosystem service studies: Approaches, shortcomings and the road ahead. *J. Appl. Ecol.* **2011**, *48*, 630–636. [CrossRef]
69. Liason. European Rural Innovation Ambassadors, Milano Porta Verde. Available online: https://liaison2020.eu/abmassadors/milano-porta-verde/ (accessed on 28 March 2023).
70. López, D.R.; Cavallero, L.; Easdale, M.H.; Carranza, C.H.; Ledesma, M.; Peri, P.L. Resilience Management at the Landscape Level: An Approach to Tackling Social-Ecological Vulnerability of Agroforestry Systems. In *Integrating Landscapes: Agroforestry for Biodiversity Conservation and Food Sovereignty*; Montagnini, F., Ramachandran Nair, P.K., Eds.; Advances in Agroforestry; Springer: Cham, Switzerland, 2017.
71. Oliver, T.H.; Heard, M.S.; Isaac, N.J.B.; Roy, D.B.; Procter, D.; Eigenbrod, F.; Freckleton, R.; Hector, A.; Orme, C.D.L.; Petchey, O.L.; et al. Biodiversity and Resilience of Ecosystem Functions. *Trends Ecol. Evol.* **2015**, *30*, 673–684. [CrossRef]
72. Chiaffarelli, G.; Vagge, I. Cities vs countryside: An example of a science-based Peri-urban Landscape Features rehabilitation in Milan (Italy). *Urban For. Urban Green.* **2023**, *86*, 128002. [CrossRef]
73. Malinowski, B. *Argonauti del Pacifico Occidentale*; Bollati Borignhieri: Torino, Italy, 2011.
74. Longo, A. *OpenAgri, 18 Progetti x 30 Ettari: Un Masterplan per un Parco della Sperimentazione Agroecologica, Workshop di Lavoro Svolto dal Gruppo wp7 Nell'ambito del Progetto OpenAgri, Bando Europeo Urban Innovative Action (UIA)*; Dipartimento DAStU—Politecnico di Milano, Dipartimento ABC—Politecnico di Milano, Dipartimento ESP—Università degli Studi di Milano: Milano, Italy, 2018.
75. Chiaffarelli, G.; Vagge, I. Methodological proposals for addressing agroecological design in periurban areas: A case study in the edges of Milan (Italy). *AGROFOR* **2021**, *6*, 45–56. [CrossRef]
76. Chiaffarelli, G.; Vagge, I. Verso un parco agroforestale alle porte di Milano: Analisi e proposte di potenziamento ecologico/Towards an agroforestry park on the outskirts of Milan: Analysis and proposals for ecological enhancement. *RETICULA* **2020**, *25*, 104–117.
77. Tzortzi, J.N.; Guaita, L.; Kouzoupi, A. Sustainable Strategies for Urban and Landscape Regeneration Related to Agri-Cultural Heritage in the Urban-Periphery of South Milan. *Sustainability* **2022**, *14*, 6581. [CrossRef]
78. Dal Borgo, A.G.; Capocefalo, V.; Chiaffarelli, G. *Il Ruolo delle Pratiche di Agricoltura Rigenerativa nella Produzione di Servizi Ecosistemici e Socio-Territoriali nell'Area Sudest di Milano*; Società di Studi Geografici: Firenze, Italy, 2022; pp. 253–262. ISBN 978-88-94690101. Available online: https://flore.unifi.it/bitstream/2158/1308390/1/DAI%20PRODOTTI%20AGROALIMENTARI%20TRADIZIONALI%20AGLI%20%E2%80%9CORI%E2%80%9D%20.pdf (accessed on 27 April 2023).
79. Dickinson, A.K. Analog Forestry: Creating Productive Landscapes. Available online: https://www.analogforestry.org/wpsite/wp-content/uploads/2014/11/etfrn-56-analogforestry-2.pdf (accessed on 27 April 2023).
80. Jackson, W. Natural systems agriculture: A truly radical alternative. *Agric. Ecosyst. Environ.* **2002**, *88*, 111–117. [CrossRef]
81. Malézieux, E. Designing cropping systems from nature. *Agron. Sustain. Dev.* **2011**, *32*, 15–29. [CrossRef]
82. Young, K.J. Mimicking Nature: A Review of Successional Agroforestry Systems as an Analogue to Natural Regeneration of Secondary Forest Stands. In *Integrating Landscapes: Agroforestry for Biodiversity Conservation and Food Sovereignty*; Montagnini, F., Ed.; Springer: Cham, Switzerland, 2017; pp. 179–209.
83. Babí Almenar, J.; Rugani, B.; Geneletti, D.; Brewer, T. Integration of ecosystem services into a conceptual spatial planning framework based on a landscape ecology perspective. *Landsc. Ecol.* **2018**, *33*, 2047–2059. [CrossRef]

84. Syrbe, R.-U.; Walz, U. Spatial indicators for the assessment of ecosystem services: Providing, benefiting and connecting areas and landscape metrics. *Ecol. Indic.* **2012**, *21*, 80–88. [CrossRef]
85. Termorshuizen, J.W.; Opdam, P. Landscape services as a bridge between landscape ecology and sustainable development. *Landsc. Ecol.* **2009**, *24*, 1037–1052. [CrossRef]
86. Czúcz, B.; Arany, I.; Potschin-Young, M.; Bereczki, K.; Kertész, M.; Kiss, M.; Aszalós, R.; Haines-Young, R. Where concepts meet the real world: A systematic review of ecosystem service indicators and their classification using CICES. *Ecosyst. Serv.* **2018**, *29*, 145–157. [CrossRef]
87. Fish, R.; Church, A.; Winter, M. Conceptualising cultural ecosystem services: A novel framework for research and critical engagement. *Ecosyst. Serv.* **2016**, *21*, 208–217. [CrossRef]
88. de Groot, R.S.; Alkemade, R.; Braat, L.; Hein, L.; Willemen, L. Challenges in integrating the concept of ecosystem services and values in landscape planning, management and decision making. *Ecol. Complex.* **2010**, *7*, 260–272. [CrossRef]
89. Attfield, R. Existence value and intrinsic value. *Ecol. Econ.* **1998**, *24*, 163–168. [CrossRef]
90. Turner, R.K.; Paavola, J.; Cooper, P.; Farber, S.; Jessamy, V.; Georgiou, S. Valuing nature: Lessons learned and future research directions. *Ecol. Econ.* **2003**, *46*, 493–510. [CrossRef]
91. Swift, M.J.; Izac, A.-M.N.; van Noordwijk, M. Biodiversity and ecosystem services in agricultural landscapes—Are we asking the right questions? *Agric. Ecosyst. Environ.* **2004**, *104*, 113–134. [CrossRef]
92. West, S.; Haider, J.; Masterson, V.; Enqvist, J.P.; Svedin, U.; Tengö, M. Stewardship, care and relational values. *Curr. Opin. Environ. Sustain.* **2018**, *35*, 30–38. [CrossRef]
93. Burkhard, B.; Kroll, F.; Müller, F.; Windhorst, W. Landscapes‘ Capacities to Provide Ecosystem Services—A Concept for Land-Cover Based Assessments. *Landsc. Online* **2009**, *15*, 1–12. [CrossRef]
94. Burkhard, B.; Kandziora, M.; Hou, Y.; Müller, F. Ecosystem Service Potentials, Flows and Demands—Concepts for Spatial Localisation, Indication and Quantification. *Landsc. Online* **2014**, *34*, 1–32. [CrossRef]
95. Caputo, P.; Zagarella, F.; Cusenza, M.A.; Mistretta, M.; Cellura, M. Energy-environmental assessment of the UIA-OpenAgri case study as urban regeneration project through agriculture. *Sci. Total Environ.* **2020**, *729*, 138819. [CrossRef]
96. Dal Borgo, A.G.; Gambazza, G.; Garda, E. *Luoghi e Comunità: Storie di Rigenerazione*; Mimesis: Milano, Italy; Udine, Italy, 2021.
97. FaunaViva. P.O.E.M.A. Progetto Ornitologico e Entomologico Monitoraggio Agroforestale. Available online: https://faunaviva.wordpress.com/attivita/progetto-poema/ (accessed on 27 April 2023).
98. De Valck, J.; Beames, A.; Liekens, I.; Bettens, M.; Seuntjens, P.; Broekx, S. Valuing urban ecosystem services in sustainable brownfield redevelopment. *Ecosyst. Serv.* **2019**, *35*, 139–149. [CrossRef]
99. Jose, S. Agroforestry for ecosystem services and environmental benefits: An overview. *Agrofor. Syst.* **2009**, *76*, 1–10. [CrossRef]
100. Dover, J.W.; Bunce, R.G.H. *Key Concepts in Landscape Ecology*; IALE UK, Coplin Cross Printers Ltd.: Garstang, UK, 1998.
101. Forman, R.T.T.; Godron, M. *Landscape Ecology*; John and Wiley and Sons: New York, NY, USA, 1986.
102. Turner, M.G.; Gardner, R.H. *Landscape Ecology in Theory and Practice, Pattern and Process*; Springer: New York, NY, USA, 2015.
103. Ingegnoli, V. *Landscape Bionomics: Biological-Integrated Lanscape Ecology*; Springer: Milan, Italy, 2015.
104. Ingegnoli, V. *Landscape Ecology: A Widening Foundation*; Springer: Berlin/Heidelberg, Germany, 2002.
105. Geoportale Regione Lombardia. Available online: www.geoportale.regione.lombardia.it (accessed on 10 October 2022).
106. Vagge, I.; Chiaffarelli, G. Validating the Contribution of Nature-Based Farming Solutions (NBFS) to Agrobiodiversity Values through a Multi-Scale Landscape Approach. *Agronomy* **2023**, *13*, 233. [CrossRef]
107. Moser, D.; Zechmeister, H.G.; Plutzar, C.; Sauberer, N.; Wrbka, T.; Grabherr, G. Landscape patch shape complexity as an effective measure for plant species richness in rural landscapes. *Landsc. Ecol.* **2002**, *17*, 657–669. [CrossRef]
108. Rutledge, D.; Miller, C. The use of landscape indices in the studies of effects of habitat loss and fragmentation. *Naturschutz Und Landschaftsplanung* **2006**, *38*, 300.
109. Gibelli, G. Ecologia del Paesaggio. In *Relazione Sullo Stato Dell'ambiente del Territorio Della Comunità Montana dei Monti Martani e del Serano—Agenda 21 [CDRom—anno 2003]*; Ministero dell'Ambiente Servizio per lo Sviluppo Sostenibile, Ed.; 2003. Available online: https://www.montagneaperte.it/wp-content/uploads/pubblicazioni/relazione-stato-ambiente/Relambspo_7_ecologia.pdf (accessed on 27 April 2023).
110. Gibelli, G.; Santolini, R. Ecological Functions, Biodiversity and Landscape Conservation. In *Nature Policies and Landscape Policies—Towards an Alliance*; Gambino, R., Peano, A., Eds.; Urban and Landscape Perspectives; Springer: Cham, Switzerland, 2015; pp. 59–67. [CrossRef]
111. Gibelli, M.G. Paesaggio e Biodiversità. *Ri-Vista Res. Landsc. Archit.* **2015**, *9*, 5–21. [CrossRef]
112. Ingegnoli, V.; Giglio, E. Proposal of a synthetic indicator to control ecological dynamics at an ecological mosaic scale. *Ann. Bot.* **1999**, *57*, 181–190.
113. Bianchi, E. Comportamento e percezione dello spazio ambientale. Dalla Behavioral Revolution al Paradigma umanistico. In *Aspetti e Problemi Della Geografia*; Corna Pellegrini, G., Ed.; Marzorati: Settimo Milanese, Italy, 1987; pp. 543–598.
114. Corna Pellegrini, G.; Geipel, R. Ricerca geografica e percezione dell'ambiente. In Proceedings of the Colloquio Internazionale sul Tema Geografia e Percezione Dell'ambiente, Milano, Italy, 26 February 1979.
115. Available online: www.wordclouds.com (accessed on 28 March 2023).
116. Ingegnoli, V. Concise evaluation of the bionomic state of natural and human vegetation elements in a landscape. *Rendiconti Lincei* **2013**, *24*, 329–340. [CrossRef]

117. Dramstad, W.E.; Olson, J.D.; Forman, R.T.T. *Landscape Ecology Principles in Landscape Architecture and Land Use Planning*; Island Press: Washington, DC, USA, 1996.
118. Fahrig, L. How much habitat is enough? *Biol. Conserv.* **2001**, *100*, 65–74. [CrossRef]
119. Rutledge, D. *Landscape Indices As Measures of the Effects of Fragmentation: Can Pattern Reflect Process?* Department of Conservation: Wellington, New Zealand, 2003.
120. Chen, L.; Fu, B.; Zhao, W. Source-sink landscape theory and its ecological significance. *Front. Biol. China* **2008**, *3*, 131–136. [CrossRef]
121. Hulshoff, R.M. Landscape indices describing a Dutch landscape. *Landsc. Ecol.* **1995**, *10*, 101–111. [CrossRef]
122. Baum, K.A.; Haynes, K.J.; Dillemuth, F.P.; Cronin, J.T. The matrix enhances the effectiveness of corridors and stepping stones. *Ecology* **2004**, *85*, 2671–2676. [CrossRef]
123. Jules, E.S.; Shahani, P. A broader ecological context to habitat fragmentation: Why matrix habitat is more important than we thought. *J. Veg. Sci.* **2003**, *14*, 459–464. [CrossRef]
124. Smart, S.M.; Marrs, R.H.; Le Duc, M.G.; Thompson, K.E.N.; Bunce, R.G.H.; Firbank, L.G.; Rossall, M.J. Spatial relationships between intensive land cover and residual plant species diversity in temperate farmed landscapes. *J. Appl. Ecol.* **2006**, *43*, 1128–1137. [CrossRef]
125. With, K.A.; Crist, T.O. Critical Thresholds in Species' Responses to Landscape Structure. *Ecology* **1995**, *76*, 2446–2459. [CrossRef]
126. Taffetani, F.; Rismondo, M.; Lancioni, A. Environmental Evaluation and Monitoring of Agro-Ecosystems Biodiversity. In *Ecosystems Biodiversity*; Grillo, O., Venora, G., Eds.; InTech: London, UK, 2011; pp. 333–370.
127. Fanelli, G.; Tescarollo, P.; Testi, A. Ecological indicators applied to urban and suburban floras. *Ecol. Indic.* **2006**, *6*, 444–457. [CrossRef]
128. Godefroid, S.; Koedam, N. Distribution pattern of the flora in a peri-urban forest: An effect of the city–forest ecotone. *Landsc. Urban Plan.* **2003**, *65*, 169–185. [CrossRef]
129. Benton, T.G.; Vickery, J.A.; Wilson, J.D. Farmland biodiversity: Is habitat heterogeneity the key? *Trends Ecol. Evol.* **2003**, *18*, 182–188. [CrossRef]
130. Donald, P.F.; Evans, A.D. Habitat connectivity and matrix restoration: The wider implications of agri-environment schemes. *J. Appl. Ecol.* **2006**, *43*, 209–218. [CrossRef]
131. Fahrig, L.; Baudry, J.; Brotons, L.; Burel, F.G.; Crist, T.O.; Fuller, R.J.; Sirami, C.; Siriwardena, G.M.; Martin, J.-L. Functional landscape heterogeneity and animal biodiversity in agricultural landscapes. *Ecol. Lett.* **2011**, *14*, 101–112. [CrossRef]
132. Tewksbury, J.J.; Levey, D.J.; Haddad, N.M.; Sargent, S.; Orrock, J.L.; Weldon, A.; Danielson, B.J.; Brinkerhoff, J.; Damschen, E.I.; Townsend, P. Corridors affect plants, animals, and their interactions in fragmented landscapes. *Proc. Natl. Acad. Sci. USA* **2002**, *99*, 12923–12926. [CrossRef]
133. Morelli, F. Relative importance of marginal vegetation (shrubs, hedgerows, isolated trees) surrogate of HNV farmland for bird species distribution in Central Italy. *Ecol. Eng.* **2013**, *57*, 261–266. [CrossRef]
134. Perović, D.; Gámez-Virués, S.; Börschig, C.; Klein, A.-M.; Krauss, J.; Steckel, J.; Rothenwöhrer, C.; Erasmi, S.; Tscharntke, T.; Westphal, C. Configurational landscape heterogeneity shapes functional community composition of grassland butterflies. *J. Appl. Ecol.* **2015**, *52*, 505–513. [CrossRef]
135. Stein, A.; Gerstner, K.; Kreft, H. Environmental heterogeneity as a universal driver of species richness across taxa, biomes and spatial scales. *Ecol. Lett.* **2014**, *17*, 866–880. [CrossRef] [PubMed]
136. Achiso, Z.; Malore, N. Parkland Agroforestry Practices on Biodiversity Conservation—A Review. *SSR Inst. Int. J. Life Sci.* **2019**, *5*, 2412–2420. [CrossRef]
137. Franco, D. *Paesaggio, Reti Ecologiche ed Agroforestazione: Il Ruolo Dell'ecologia del Paesaggio e Dell'agroforestazione Nella Riqualificazione Ambientale e Produttiva del Paesaggio/di Daniel Franco*; Il Verde Editoriale: Milano, Italy, 2000.
138. Tischendorf, L.; Fahrig, L. On the usage and measurement of landscape connectivity. *Oikos* **2000**, *90*, 7–19. [CrossRef]
139. Holloway, L.; Hubbard, P. *People and Place: The Extraordinary Geographies of Everyday Life*, 1st ed.; Routledge: London, UK, 2001.
140. Comune di Milano. Food Wave. Available online: https://www.comune.milano.it/aree-tematiche/relazioni-internazionali/progetti-ue/food-wave (accessed on 27 April 2023).
141. Comune di Milano. La Scuola dei Quartieri. Available online: https://lascuoladeiquartieri.it/ (accessed on 27 April 2023).
142. Plieninger, T.; Bieling, C.; Fagerholm, N.; Byg, A.; Hartel, T.; Hurley, P.; López-Santiago, C.A.; Nagabhatla, N.; Oteros-Rozas, E.; Raymond, C.M.; et al. The role of cultural ecosystem services in landscape management and planning. *Curr. Opin. Environ. Sustain.* **2015**, *14*, 28–33. [CrossRef]
143. Prete, C.; Cozzi, M.; Viccaro, M.; Sijtsma, F. Foreste e servizi ecosistemici culturali: Mappatura su larga scala utilizzando un approccio partecipativo. *Ital. For. E Mont.* **2020**, *75*, 119–136. [CrossRef]
144. Wartmann, F.; Purves, R. Investigating sense of place as a cultural ecosystem service in different landscapes through the lens of language. *Landsc. Urban Plan.* **2018**, *175*, 169–183. [CrossRef]
145. Magnaghi, A. *Il Progetto Locale: Verso la Coscienza di Luogo, Nuova Accresciuta ed.*; Bollati Boringhieri: Torino, Italy, 2010.
146. McGarigal, K.; Marks, B.J. *FRAGSTATS: Spatial Pattern Analysis Program for Quantifying Structure*; U.S. Department of Agriculture, Forest Service: Portland, OR, USA, 1995; Volume PNW-GTR-351.
147. O'Neill, R.V.; Krummel, J.R.; Gardner, R.H.; Sugihara, G.; Jackson, B.; DeAngelis, D.L.; Milne, B.T.; Turner, M.G.; Zygmunt, B.; Christensen, S.W.; et al. Indices of landscape pattern. *Landsc. Ecol.* **1988**, *1*, 153–162. [CrossRef]

148. Walz, U. Landscape Structure, Landscape Metrics and Biodiversity. *Living Rev. Landsc. Res.* **2011**, *5*, 3. [CrossRef]
149. Ingegnoli, V.; Giglio, E. *Ecologia del Paesaggio: Manuale Per Conservare, Gestire e Pianificare L'ambiente*; Sistemi editoriali: Napoli, Italy, 2005.
150. Fabbri, P. *Ecologia del Paesaggio per la Pianificazione/Pompeo Fabbri*; Aracne: Roma, Italy, 2005.
151. Forman, R.T.T. *Land Mosaics: The Ecology of Landscapes and Regions*, 1st ed.; Cambridge University Press: Cambridge, UK, 1995.
152. Ermer, K.; Hoff, R.; Mohrmann, R. *Landschaftsplanung Inder Stadt*; Ulmer: Stuttgart, Germany, 1996.