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Collaborative Monitoring of Plant Biodiversity and Research on Sweet Acorn Oaks within Paths of Knowledge and Sustainability Education

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Abstract: Numerous studies have shown the multiple benefits of plant biodiversity and the crucial role of residents' awareness of conservation and land management. Plant biodiversity was investigated in an analytical monitoring report conducted jointly with the local population engaged in livestock activities and young residents who were shifting toward hospitality and tourism. The study area, covering over 800 km^2 in Sardinia, is half forested and attracts interest in its landscape. During our research, genotypes of *Quercus ilex* L., with sweet acorns rich in polyphenols, as the oldest ecosystem services in these rural communities, were discovered. Collaborative monitoring focused attention on the benefits of plants in different habitats as follows: 53% were known to livestock farmers as food for local breeds of goats and pigs, 15% were official, and 13% were endemic. They had also been used for human nutrition within the Mediterranean diet and attracted interest for their use in landscapes and gardens. This study analyzes numerical data from critical and educational perspectives. These data serve as indicators of ecosystem health for the purpose of sustainable management policies and attest to collaborative monitoring as a tool for analyzing human activities and the necessary balance between profit and biodiversity conservation, given the current challenging climate change conditions.

Keywords: plant biodiversity; rural communities; *Quercus ilex*; habitat; Mediterranean diet; landscape enjoyment

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1. Introduction

Local populations possess knowledge of the benefits of plants [1], which include forests, natural pastures, plants used in human nutrition, and medicinal plants [2], supporting the enjoyment and well-being of natural life and landscape culture. Town mayors and a significant group of residents, as well as livestock farmers and tourism entrepreneurs, are crucial in acquiring direct information on ecosystem services and perceptions of well-being [3,4] and in setting strategies for environmental conservation and sustainable development [4]. The aspect of sustainability and the values of landscape identity and perceptions [5] by populations have been highlighted in many studies to achieve the valorization of territorial resources [6].

1.1. Biodiversity and the Preservation of the Balance between Conservation and Profit

In public and protected areas [7], resident communities have the challenging task of balancing business activities to avoid the risk of declining genetic richness [8], which

currently exists under increasingly uncertain conditions due to varying rainfall patterns and rising temperatures. The management of this requires community participation [9] and awareness. It entails overcoming a purely utilitarian perspective, which affects the balance between profit and conservation, as seen in many studies [10,11], leading to increased animal rearing and loss of biodiversity because of overgrazing [12,13]. The presence of livestock farmers operating under conditions of equilibrium, without exceeding the carrying capacity of ecosystems [14], provides the opportunity to maintain the richness of biodiversity. Over the past few decades, the integration of hospitality and experiential tourism [15] has taken place. This is largely thanks to younger generations and education related to environmental protection, which are crucial elements for shifts in perceptions regarding forests that affect regulations, well-being, and the aesthetic value of the landscape.

1.2. Mediterranean Holm Oak Forests and the Contents of Acorns as Ecosystem Service Benefit

The forests providing habitats for *Quercus ilex* and *Q. rotundifolia* are the most extensive in the Mediterranean countries of Europe and northern Africa, covering more than 700,000 km^2, predominantly in the Iberian Peninsula, Italy, and Greece [16]. Rural communities have always considered the contents of acorns to be an ecosystem service benefit to human nutrition [17,18] due to the high amounts of antioxidant polyphenols and complex sugars. Therefore, such contents have been explored as functional foods of medicinal interest [19], as well as food for pigs that have positive effects on meat and fat quality and that are richer in mono- and polyunsaturated acids [20].

1.3. Plants Eaten by Grazing Animals and the Conservation of Biodiversity

Mediterranean pastures in which goats and pigs are raised in a semiwild state have been the focus of many studies in relation to farmers' actions to preserve plant biodiversity and increase ecosystem service provisioning in grasslands [21–23] or to offset the risks of loss, especially in public or protected areas [24]. The list of plants eaten by animals shifts from those with the greatest appeal to them to those they eat whenever they are compelled by a shortage of reproducing plant species or by overgrazing. Collaborative monitoring with livestock farmers is useful to update the list of edible species and to achieve greater awareness of the conservation and sustainability of endemic species.

1.4. Plant Biodiversity in Human Nutrition and Folk Medicine

Plants, as primary producers, and animals reared on semiwild pastures provided most of the food for rural people in the past. Wild plants form a part of the human diet, and many species are still favored and spread through seed collection and exchange [25]. The variety of secondary metabolites produced by wild plants, which are used as dietary sources of compounds with antioxidant and biological activities [26] to treat diseases, has been reported in many studies. Most often, research has focused on the presence of active biomolecules with high phenolic contents, as well as antioxidant and anti-free-radical effects. Several studies have highlighted the importance of diet as an epigenetic factor influencing health conditions. According to research, the Mediterranean diet appears to be a nutritional pattern capable of promoting health [27]. The marked biodiversity of plant species has been a major contributor to the consolidation of the diet–health relationship in the population, which is in line with the conceptual model proposed by Marselle [28], which precisely views the strengthening of biodiversity as the most powerful tool to counter the increase in chronic noncommunicable diseases. Over the past decade, further studies on healthy human longevity have highlighted the importance of diet in addition to population-level genetic factors [29–31].

1.5. Plant Biodiversity, Aesthetic Enjoyment and Well-Being

Plant biodiversity has aesthetic value in terms of landscapes [32], contributing to human well-being as the "nonmaterial benefits people obtain from ecosystems through spiritual enrichment, cognitive development, reflection, recreation, and aesthetic experi-

ences" [33]. Local stakeholders benefit from the cultivation of plants with richly colored and fragrant blooms and the use of shrubs and trees to shape home gardens and parks beyond a vision of food production [34], contributing to the enhancement of cultural identity and the development of a sense of place as a category of cultural ecosystem services [35].

1.6. Conceptual Outline of the Research and Purpose

The conceptual framework of our research is based on the interrelationships between plant biodiversity and the benefits of socioeconomics and well-being (Figure 1). Our goals were to test the collaborative method, which is seen as a shared path of knowledge of biodiversity's functions, to obtain measurable scientific data over time in years, which is useful for sustainable management policies and strengthening the link between natural and human capital.

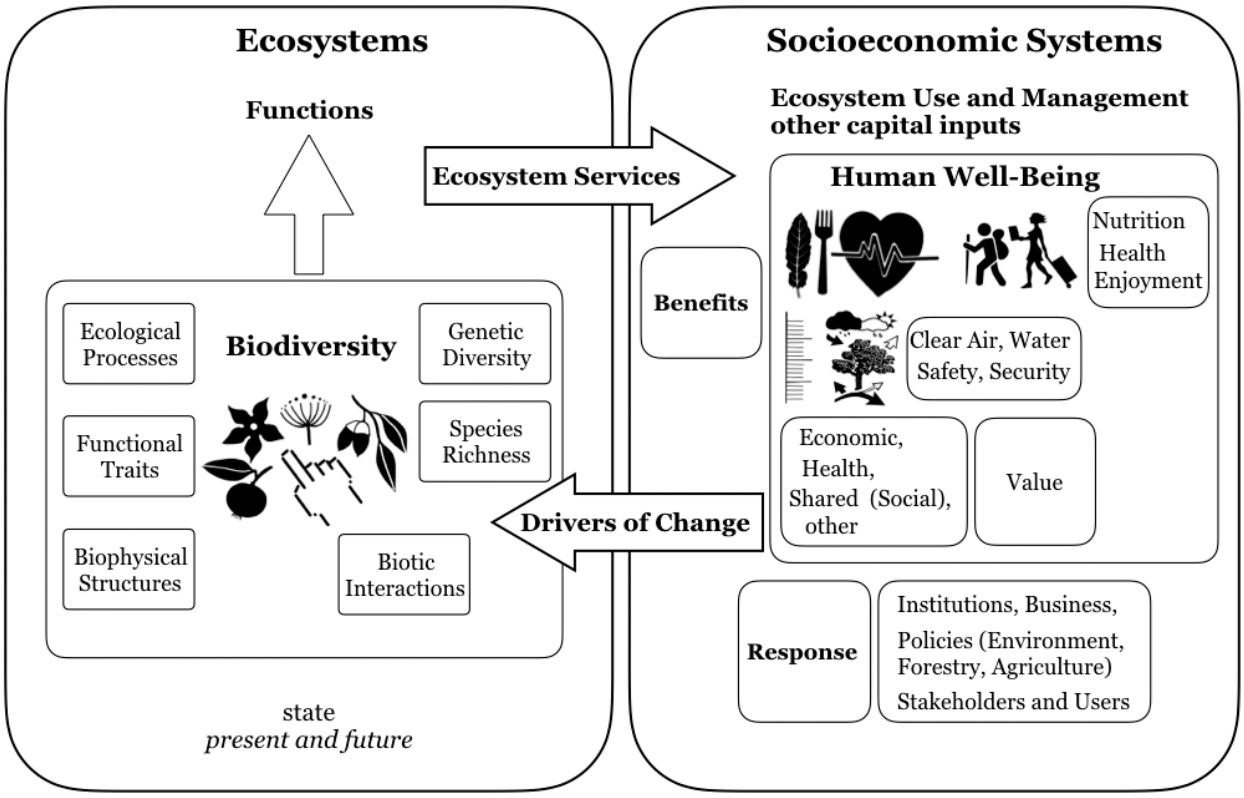

Figure 1. The conceptual framework for plant biodiversity and its link to ecosystem use and management adopted in this work. Source: Maes et al. [36], redesigned.

2. Materials and Methods

2.1. Study Area

The monitored area covered more than 800 km^2 in east-central Sardinia (Figure 2), and approximately 85% was publicly owned and protected. Genetic richness characterizes the area, featuring 19 habitats marked with Natura 2000 and EUNIS codes (Figure 3) summarizing the landscape traits and protection measures [37]. For the purposes of communicating the benefits of biodiversity to local communities, we named the study area Terre dell'Aquilegia; this helped emphasize how the genetic richness extends beyond the administrative limits of municipalities and has proven effective in encouraging the cooperation of mayors in its implementation. A further peculiarity of the monitored area is that it overlaps with an area of the planet in which the phenomenon of human longevity has been evidenced by the presence—greater than the demographic average—of healthy ultra-centenarians. Research has highlighted many epigenetic factors related to lifestyles and, particularly, to Mediterranean nutrition and diet in these areas, called Blue Zones [38].

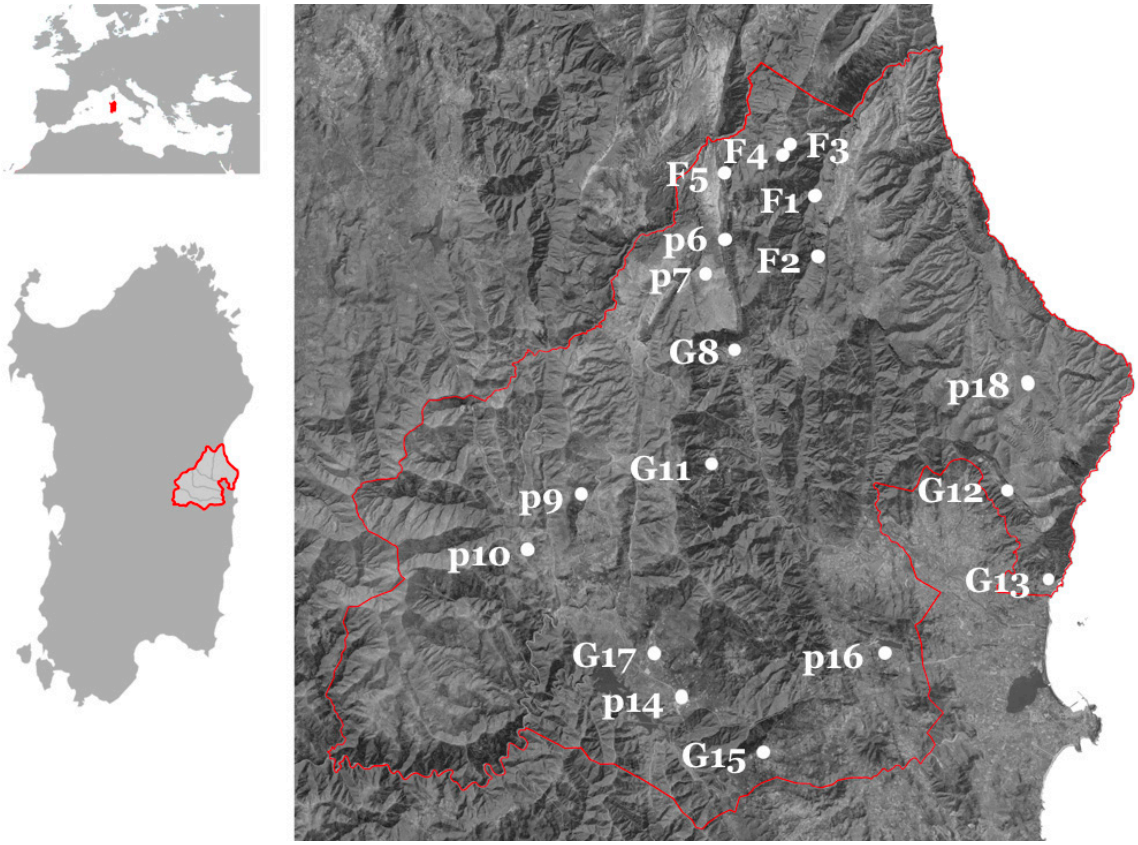

Figure 2. Case study area (Terre dell'Aquilegia) and monitoring pathways of plant biodiversity.

Figure 3. Landscape elements in the study area: a simplified illustration of the identity characteristics and EUNIS habitat codes.

2.2. Pathways for Monitoring Plant Biodiversity

The 18 monitoring pathways were in forest habitats (F1, F2, F3, F4, and F5) with a predominance of holm oak [39] on public land granted by municipalities for local goat and pig farming and for hospitality and trekking tourism (p6, p7, p9, p10, and p14), and in family gardens (G8, G11, G12, G13, G15, and G17). These monitoring pathways were used in different seasons, from 2019 to September 2023. The length of each monitoring pathway was approximately 5 km, although, for family gardens, the survey of edible wildlife species was located in areas of less than one hectare.

2.3. Accessing the Habitats

The surveys are reported as Supplementary Materials in the following file: Table S1—Ecosystem biodiversity and socioeconomic and well-being benefits report.docx. The four columns report the (1) plant name and family; (2) habitat; (3) biodiversity in ecosystems in relation to the genetic richness, especially endemism; and (4) benefits and knowledge that farmers have of the plants, including whether they are palatable by grazing goats and pigs, eaten in the absence of anything else, or when they are dry, as well as plants discarded by animals because they are unpalatable or toxic. We included information on medicinal and healing plants in folk medicine, as well as on the wild plants included in the Mediterranean diet, which are found in family gardens and collected in the rural surroundings of villages for local recipes. We also added information about plants that characterize the landscape and are grown in gardens. The habitats in the study area were as follows: 9340—*Quercus ilex* and *Quercus rotundifolia* forests; 6310—Dehesas with evergreen *Quercus* spp.; 92D0—southern riparian galleries and thickets (*Nerio—Tamaricetea and Securinegion tinctoriae*); 5320—low formations of Euphorbia close to cliffs with Sclerophyllous scrub (matorral); 6220—pseudo-steppe with grasses and annuals of *Thero-Brachypodietea* natural and semi-natural grassland formations; 5330—thermo-Mediterranean and predesert scrub–Sclerophyllous scrub (matorral); 91E0—alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior*; 9560—endemic forests with *Juniperus* sp.pl.; 1210—annual vegetation of drift lines; 9320—*Olea* and *Ceratonia* forests; 8210—calcareous rocky slopes with chasmophytic vegetation; 8130—Western Mediterranean and thermophilous scree rocky habitats and caves; 8130—Western Mediterranean and thermophilous scree; 5210—arborescent matorral with *Juniperus* spp.; 3170—Mediterranean temporary ponds; 3290—intermittently flowing Mediterranean rivers of the *Paspalo-Agrostidion* freshwater habitats; 5430—endemic phryganas of the *Euphorbio-Verbascion* Sclerophyllous scrub (matorral); I2.2—small-scale ornamental and domestic garden areas; and FB.4—vineyards.

2.4. Criteria for Collaboration with Local Communities

The collaboration with local communities had two aims, as follows: on the one hand, to help raise awareness and environmental education about conservation and sustainable management, and on the other hand, to gain firsthand knowledge and understanding of the difficulties in the relationships between natural and human capital to minimize possible conflicts. The following four groups were considered: the mayors of the five municipalities in the area; farmers who had been given land in concession; the owners of family gardens and elderly people who had knowledge of edible and healing plants; and a sample of more than 1000 tourists over the 5-year monitoring period.

2.5. Searching for Ancient Ecosystem Services of Holm Oak (*Quercus ilex L.*) with Sweet Acorns

In this case study area, the forest was approximately 50% covered with holm oak, with *Quercus ilex* L. as the prevailing species. Significant intraspecific genetic variability was favored by the local people for the ecosystem services provided by acorns, including human nutrition and as food for pigs farmed in a semiwild state. Biodiversity surveys in forest areas were aimed at identifying the holm oak trees thought by residents and pig farmers to have different features than other holm oaks. Regarding the alleged difference, farmers referred to holm oaks with sweeter acorns in cenoses consisting of multiple trees,

chosen primarily by semiwild grazing wild boars and pigs. The entire forest area was considered as the reference population. Sampling was conducted on 25 holm oak trees at 5 forest stations indicated as F1, F2, F3, F4, and F5 on the map. Station F1 was the control, exhibiting standard features of holm oaks in the study area, i.e., it had contents presumably not different with respect to the chemical composition of the acorns. In November 2021 and 2022, 25 acorn samples of approximately 700 g each were collected in 3 repetitions, for a total of 75 samples, which were assigned anonymous codes for the chemical laboratory for immediate analysis of the sugar and total polyphenol contents. Macroelements, trace elements, and heavy metals were also examined, supposing that any differences could serve for further studies on plant physiology and nutrient uptake from the soil.

2.6. Chemical Analysis of Acorns

Each of the 20 samples was tested in a double analysis at the Agris agricultural chemistry laboratory. The laboratory results were analyzed with Statgraphics Centurion 18 software, using analysis of variance (ANOVA) followed by the Tukey–Kramer test at a 95% confidence level. The method used for the detection of total sugars was developed in accordance with Ministerial Decree No. 168, dated 3 February 1989, Official Methods of Analysis for Vegetable Preserves, Title II, Paragraph 18, Measurement of Sugars, as well as the report by the Italian Health Authority ISTISAN 96/34 [40], methods of analysis for chemical control of food. For total polyphenols, the method used was the extraction of the lyophilized sample with a mixture of methanol and water and instrumental measurement after coloration with the Folin–Ciocalteu reagent, as indicated by Dewanto et al. [41].

2.7. Analysis of Weather and Climate Data

Climatic changes in the Mediterranean region have caused concern [42–44] about the negative impacts of particularly extreme events with rainfall and flooding, which have become more frequent in recent decades, as well as rising temperatures. Data on rainfall and average maximum temperatures were considered for agroforestry purposes and to share the importance of actions to protect biodiversity, as well as forest cover and mitigation measures [45]. Data for the years 2019–2023 were obtained from the daily records of 5 meteorological stations in the given area. The meteorological stations were operated by the Meteo-Climatic Department of the Region of Sardinia [46], which also provided climate data for the 30-year period 1981–2010. Daily rainfall and maximum temperature averages in different months from 2019 to 2023 were compared with the climate data from the 30-year period 1981–2010 from the same area.

3. Results

3.1. Finding the Mother Plants of Holm Oak with Sweet Acorns and Rich in Polyphenols

Chemical analysis confirmed the higher contents of sugars and polyphenols in the mother plants of holm oak, indicated by local people and considered to be a precious legacy of the past. Table 1 shows the laboratory data expressed in g/100 g for sugars and mg/100 g for polyphenols. The monitoring forest station F1 accounted for the generality of ordinary holm oaks spread throughout the territory. Stations F3, F4, and F5 differed from F1 in terms of their higher contents of sugars and polyphenols, whereas F2 did not confirm the expected significant differences. Figure 4 shows photographs of the leaf and acorn samples, from which it can be observed how the leaves are smaller and slightly rounded. Smaller leaves on trees producing acorns with higher sugar and polyphenol contents seem to be a contradiction. This fact, however, can partly be interpreted by the observation that this plant has a denser leaf system with favorable exposure to sunlight. Confirmation of its sweet and polyphenol-rich features helps in understanding why local people have considered it functional in human nutrition for centuries; in times of poverty, such as after World War II, it was appreciated as an ingredient in acorn bread, and it is currently used to fatten pigs.

Table 1. Mean contents of sugars and total polyphenols in the dry matter of acorns in the sampling areas of forest stations F1 to F5. Analysis of variance (ANOVA) and Tukey–Kramer test with a $p < 0.05$. On the first lines with—(Xm), ++ indicates significant differences.

Forest Station	F1	F2	F3	F4	F5
Sugar—Xm g/100 g	2.92	2.31	3.95 ++	4.44 ++	3.24
	2.89	2.33	3.95	4.46	3.25
	2.90	2.31	3.94	4.45	3.23
	2.94	2.29	3.94	4.44	3.26
	2.89	2.31	3.97	4.43	3.22
	2.92	2.32	3.95	4.45	3.24
Polyphenols—Xm mg/100 g	2013	2084	4504 ++	4504 ++	3076 ++
	2014	2084	4506	4506	3075
	2013	2083	4504	4503	3076
	2012	2082	4504	4503	3075
	2015	2085	4506	4504	3076
	2012	2086	4502	4504	3075
Dry matter %	55.1	57.2	60.2	56.6	57.7

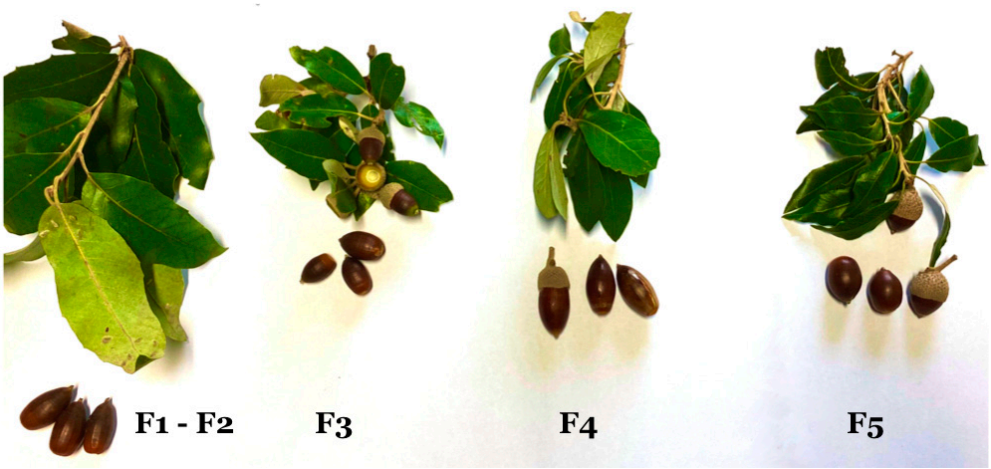

Figure 4. Photographs of the acorns and leaves of *Quercus ilex* L.: ordinary holm oak (F1–F2) and those with a sweet character (F3, F4, and F5).

3.2. Results of Plant Biodiversity Monitoring along the Pathways of Farmers and Tourists

The biodiversity of plants surveyed along the monitoring pathways is shown in graphic form in Figure 5. We identified 541 taxa, 15% of which were medicinal plants, 13% were endemic, and 7% were toxic. The chart on the right summarizes the report compiled with the cooperation of farmers along the pathways. It shows that 54% of the plants are also eaten by goats and pigs of local breeds when grazing, ranging from the most palatable plants—mainly from the Poaceae and Fabaceae families—and the shrubby and tree-like plants of the Mediterranean shrub to the nonpalatable species, which are only eaten under extreme conditions of need or overgrazing. The eating preferences of local grazing breeds are most significant when they are particularly hungry. The example of ferula (*Ferula communis* L.) is worth mentioning here, as this plant is toxic [47] in all its green parts and is, therefore, avoided by goats, which is a behavior they have learned from their mothers. In summer, however, when the plants are dry and lignified, hungry goats strike them with their horns to eat the seeds that fall: the only nontoxic part of the plant. The pathways used by livestock farmers run throughout the entire study area from the plateaus (Supramonte and the Tacchi) to the sea and through deep gorges (i.e., canyons) to sheepfolds, and are

part of a culturally and socioeconomically poor heritage that has recently been repurposed into hospitality and tourism industry services by young people.

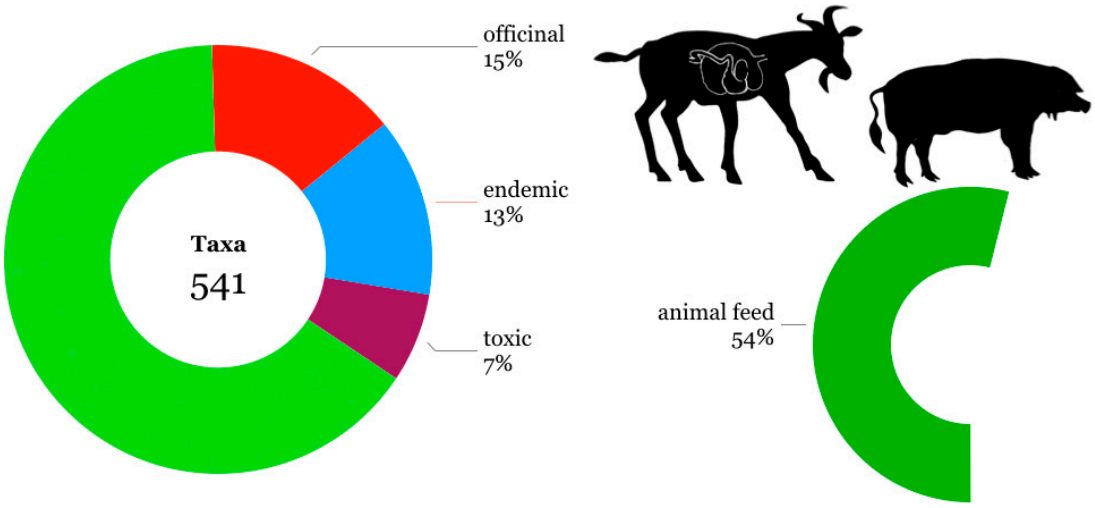

Figure 5. The number of taxa categorized as medicinal, endemic, toxic, and animal feed, in percentage, surveyed along the monitoring pathways.

3.3. Wild Edible Plants Used in Nutrition and Medicine

In family gardens, we found 15 species of wild plants used in the Mediterranean diet and 68 species with medicinal uses. This case study provides an opportunity to further investigate the epigenetic factors of nutrition in relation to the phenomena of longevity and good health among the population of this geographical area. The number of plants with medicinal applications observed in this study is remarkable; it testifies to their near-routine use, albeit entrusted to the competent management of particularly skilled individuals. Although they were used for simple pathologies, elaborate preparations and uses seem to have existed against some pathologies of nontrivial etiology. Locally, there is a marked technocratic consciousness of the function of their natural principles, such as in other areas of the Mediterranean and in Sardinia itself [48], which are intended in their terminological fullness and not as a means through which some supernatural intercession can take place, as is the case in other non-European countries. The presence of such a large portion is also undoubtedly favored by the ideal microclimatic conditions of speciation, particularly for the more polymorphic plants, as well as the heterogeneity of the environments, which can unequivocally influence the formation of the phenotype and secondary metabolites. This contingent consists of species with high pharmaceutical value from which molecules of wide therapeutic use and, consequently, of extreme commercial interest are still being extracted. Specific targeted phytochemical and pharmacological studies have also highlighted the different actions and the heterogeneous pharmacokinetic diversification of the same or new metabolites present in wild plant species. The number of aromatic and essential plants commonly used in daily nutrition, as well as essences with cosmetic and herbal interests, is significant.

3.4. Biodiversity of Plants for Landscape Enjoyment and Gardens

The landscape in this research is summarized by the illustration in Figure 3, which was created during the monitoring period, showing distinctive geomorphological features and habitat codes. The analysis of the Mediterranean plants in this study provides a better understanding of the aesthetic value and the enjoyment of shapes, colors, and scents. The sense of well-being experienced in nature while hiking trails and admiring the naturalness of elements, as well as forest bathing, are aspects of the landscape that produce enjoyment. Plants observed along the monitoring pathways were reported in the biodiversity plant file, as they also reveal the effects of human activities along the paths known by the

local communities. The euphorbias (*Euphorbia* spp.), asphodels (*Asphodelus microcarpus*), brooms (*Genista corsica*, *Cytisus* spp.), oleanders (*Nerium oleander*) and hellebore (*Helleborus argutifolius* Viv.), which tinge the valleys and impervious walls of this case study's area, are toxic plants to animals and exhibit ecological forms of greater fire resistance.

3.5. Climate Variability Measurement Data

The rainfall and maximum temperatures recorded from 2019 to 2023 compared with the 30-year climate series (1981–2010) can be seen in the graphs in Figure 6. The histograms of the rainfall distribution show differences in November (with rainfall being recorded at meteorological stations with higher intensity and increasing characteristics of flooding) and, in particular, a clear increase in the maximum temperatures, indicated by the red dashed line.

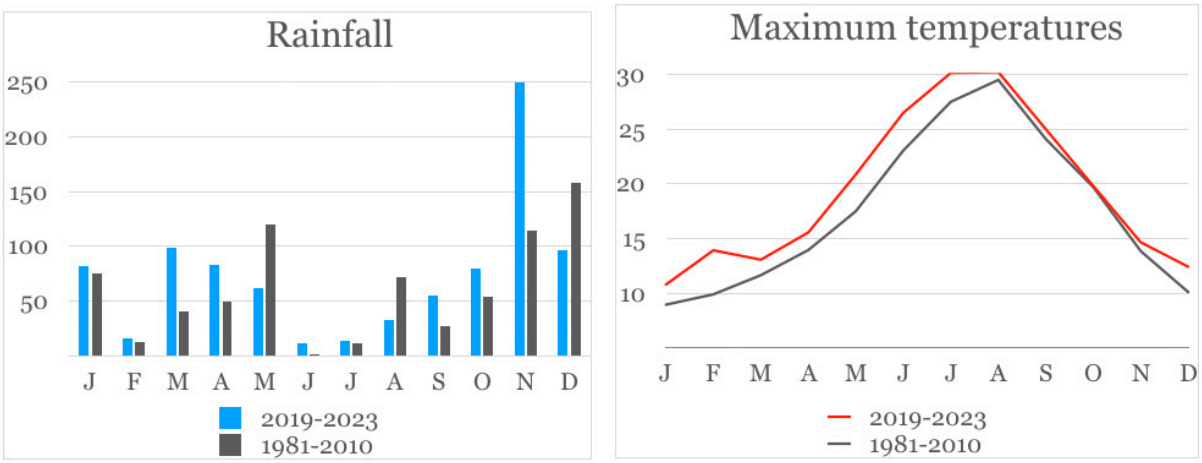

Figure 6. Rainfall (mm) and maximum temperature (°C) for the years 2019–2023 and the climate series 1981–2010.

4. Discussion

This work was inspired by the classic Western cultural idea of pathways involving an in-progress knowledge of reality, comparing different points of view and different tools, i.e., scientific rigor and the knowledge held by local communities who use the natural resources, shape the landscape, and have the difficult task of maintaining a balance between conservation and profit. Our study provides evidence for the valorization of local know-how as intangible to the culture. In carrying out this work, we confirm that the knowledge held by local communities plays a crucial role in the conservation of biodiversity in pastures and forests, as reported in many studies, with particular concerns for the Mediterranean basin [49,50], taking care of animal welfare conditions, and preserving local breeds. Along the forest pathways, the confirmation of the discovery of the mother plants of holm oak with sweet acorns highlights the ancient forest culture of the Mediterranean people, as well as the selection of a feature useful for human and animal nutrition, which, for the selected plants, was prioritized over timber supply. This feature has been discussed from the following two aspects: pig breeding [51] management policies and sanitary measures to contain the African swine fever virus. One additional aspect noted in this collaborative monitoring work is the favorable attitude of the local community toward the conservation of the mother plants and the protection of forest habitats when the scientific aspects of biodiversity are recognized, which strengthens the connection between natural capital and human capital. Forests are not places for livestock farming, but they have ecological importance in the biosphere and in the provision of multiple ecosystem services [52]. The presence of inhabitants of rural communities, in fact, amplifies the genetic variability and enjoyment of plants, but it can also restrict them through overgrazing and fires or through excessive mass tourism in fragile ecosystems. On the one hand, the 541 taxa identified

along the monitoring pathways express the factual objectivity of a territory providing many benefits and allow us to understand the value they provide under specific climatic, ecological, geographic, and socioeconomic conditions; on the other hand, this number of taxa has limitations and serves, critically and educationally, as an indicator of the health of an ecosystem for sustainable management policies. Identifying the number of taxa with the percentage of plants eaten by goats and pigs does not give this study zoo-technical purposes. Rather, it is intended to focus attention on the ecosystem benefits of biodiverse functions related to genetic richness for animal nutrition in natural pastures and, therefore, foster a deeper understanding of how many plants are likely to be lost under conditions of excessive grazing pressures. One weakness that has emerged was communicating the multiple functions of plant biodiversity to older farmers, who are prone to the exploitation of pastures with excess numbers of bred animals or by replacing local breeds of goats and pigs with cattle that are unfit for maintaining the balance between profit and preservation of the local genetic diversity. A key strength has been the ecosystem service of human well-being that is generated by plant biodiversity through nutrition via the Mediterranean diet, as well as the enjoyment of the landscape. Poor pastoral farming [53], which, mainly thanks to young people, is evolving toward the experiential tourism of hospitality and nature trekking, has been prioritizing environmental protection and sustainable management. This case study of Terre dell'Aquilegia, as part of a Blue Zone, could lend opportunities for further scientific research on the Mediterranean diet and conditions of well-being. A significant element of surprise and discussion was how much landscape is directly related to plant biodiversity. Many but not all plants distinctive of the landscape have been found in family gardens. The lack of aesthetic appreciation for cultivating some of them in home gardens can perhaps be explained by the habit of considering them as already part of the landscape, which local people see as a natural garden, or it could depend on the fact that their presence is seen as that of a weed in pastures, as, for example, in the case of hellebore, cistus, asphodel, broom, or euphorbias. Finally, the rise in maximum temperatures and the change in rainfall distribution, which was shared by the local communities, warn of the increased and accelerated risks of losses in biodiversity and landscape quality in extreme cases of overgrazing and wildfires.

5. Conclusions

The analysis of the data collected and the experience of interacting with stakeholders have taught us how to improve collaboration. Therefore, we suggest that collaborative monitoring within paths of knowledge should be used as an effective method, which extends beyond this specific case and could prove useful in many other cases in which complexity requires participation. We have seen how the conceptual scheme (Figure 1) of biodiversity and ecosystem services has been appreciated as a clear starting point that helps to communicate effectively and leads to collaboration and an increased sense of ownership in the area, as well as trust in a scientific approach. We offer an interpretation of biodiversity in numerical terms, which reveals an almost-hidden richness, as was the case with the mother plants of holm oak with sweet acorns. In particular, the discovery of the mother plants strengthened the affective connection with the past and the vision of forests not only as sources of timber but, more importantly, as habitats for health, well-being, and connection with nature, as well as resilience and adaptation under the conditions of a changing climate. Along the pathways, we noted our limited knowledge of the stages of habitat depletion in some extreme cases, but we also gained a profound understanding of the benefits of plants used for human and animal food, which have names in the local language. It was also interesting to find the high number of plants used in folk medicine, a clear positive sign for improving scientific studies and collaborative approaches. Regarding the pathways, we favored freedom of choice within all habitats in this case study to obtain robust data to estimate biodiversity. We would like to emphasize how collaborative monitoring encouraged a positive approach to feeling at home and exchanging knowledge. It also fostered involvement in sustainable management and a comprehensive view of

ecosystem services and well-being, as highlighted in many studies [54,55], bringing back the centrality of biodiversity conservation and contributing to this on a regional scale.

Supplementary Materials: The following supporting information can be downloaded at: https://www.mdpi.com/article/10.3390/environments11030059/s1, Table S1: Ecosystem biodiversity and socioeconomic and well-being benefits report.

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