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Article

Assessing and Monitoring the Sustainability in Rural World Heritage Sites

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Abstract: In 2002, the United Nations Educational Scientific and Cultural Organization (UNESCO) established the importance of the sustainability and the need of management plans for the safeguard of cultural heritage. No models, rules or specific definitions have been provided for this purpose. By 2014, UNESCO had recognized 16 rural landscapes as cultural heritage sites. This paper aims to understand the management systems adopted by the rural World Heritage Sites over time in order to identify the best practices, strategies, actions and measures applied for the conservation of their universal value with a particular focus on sustainability. A comparative study, analyzing the management plans for these sites, was conducted. The drawing up of site management plans for such rural landscapes is a difficult process. In fact, private and public authorities and several stakeholders are involved, and all of them should participate actively in the decision making process. To ensure the sustainability of these sites, it is important to evaluate several parameters and to design an integrated plan. We focused on assessing and monitoring sustainability in rural World Heritage Sites, and our results could be useful for the implementation of existing plans and processes for drawing up management plans for future UNESCO cultural heritage.

Keywords: cultural heritage; management plan; rural landscape; UNESCO

1. Introduction

1.1. Research Aim

This research aims to determine how the sustainability of rural World Heritage Sites recognized as having outstanding universal value can be ensured. Firstly, the importance of the management plan of World Heritage Sites is underlined, and secondly, the rural landscapes' sustainability is analyzed. In 2002, the United Nations Educational Scientific and Cultural Organization (UNESCO) established the importance of sustainability and the need for management plans to safeguard cultural heritage. However, no models, rules or specific definitions have been provided for this purpose. This paper is targeted at understanding the management systems adopted by the rural World Heritage Sites over time in order to identify the best practices, strategies, actions and measures applied for the conservation of their universal value with a particular focus on sustainability. The management systems of the existing rural UNESCO sites were studied by the comparison of nomination files and management plans.

1.2. The Management Plan of World Heritage Sites

UNESCO has identified the formal recognition and management of World Heritage Sites (WHS) as a key means of conserving the world's cultural and natural heritage for present and future generations through the World Heritage Convention (WHC, "Convention concerning the Protection of the World Cultural and Natural Heritage", Paris, 16 November 1972). The member States of this Convention accepted the responsibility of ensuring the identification, protection, conservation, enhancement and transmission to future generations of the cultural and natural heritage located in their territory [1]. With the Budapest Declaration (2002), the UNESCO World Heritage Committee invited the member parties of the Organization to strengthen the initiatives designed to protect world cultural heritage by fostering the actual protection of each asset already included (or for which inclusion was encouraged) on the World Heritage List (WHL). Moreover, the Committee invited them also to ensure an equitable balance between the conservation, sustainability and development of the various sites, which was relevant not only at the cultural level but also at the economic and social level. Since 2002, UNESCO has established the importance of sustainability and the need for management plans to safeguard cultural heritage. The Budapest Declaration established the need and the importance of management planning for all sites on the WHL in order to identify good practices, strategies and measures for the protection and preservation of their universal value over time [2]. The first purpose of the Budapest Declaration was to promote the adoption of policies and issues that bound the protected area with economic and social activities. In fact, all of the sites (natural and cultural) recognized as having outstanding universal value (OUV) started to produce a specific management plan (MP) [3].

The management plan should be developed to protect, sustain and conserve the OUV of the cultural and natural sites. Site management programs should include public information, reasonable provision for site stabilization, monitoring and protection against interference [4]. To draw up a concrete MP, it is important to combine general strategies and policies with specific goals and objectives that relate to the site elements recognized by UNESCO as OUV. With the aim to protect and preserve traditional and historical features of OUV sites over time, MPs should indicate long-term strategies. Regarding the MP, UNESCO's Operational Guidelines for the Implementation of the World Heritage Convention [5]

provides a precise scheme composed of different parameters. In particular, the definition of the site, the administrative details, the relevant and responsible organizational structure and the discussion of the site should be checked and analyzed. Regarding the discussion of the site parameter, the assessment of its significance, a report on its status, its potential and any relevant threats and opportunities should be included in the MP. By contrast, UNESCO did not provide models, rules or specific definitions. Its indications, policies and general goals are mainly theoretical and difficult to “translate” into practicable actions and strategies [6,7]. Dongiovanni *et al.* [8] analyzed the MP system of WHS and identified four necessary steps. According to these authors, for integrated planning, the following steps should be implemented: firstly, the site’ analysis and identification of significant features, site designation, management actions and monitoring processes. Regarding monitoring processes, Peano *et al.* [9] selected specific landscape indicators. In particular, several categories of indicators (such as land use, ecological, historic and cultural, visual and social perception and economic) were proposed for assessing and monitoring landscape quality over time.

1.3. The Sustainability Concept

The definition of cultural landscape sustainability is largely debated. For Hietala-Koivu (1999), sustainability can be defined as the successful management of resources to satisfy human needs [10]. For maintaining agricultural landscape’ sustainability, ensuring the spatial compatibility of environmental management and profitable agriculture are the main goals. By contrast, Landorf [11] noted that the sustainability concept of World Heritage is vague and undefined. Furthermore, the meaning of sustainable landscape is hard to define, because it appears in so many different research areas [12]. According to Antrop [13] the idea of sustainable landscapes might be in contradiction with a basic definition of landscape. Moreover, for rural landscapes characterized by agricultural activity and human presence, this contradiction is more evident [14]. In fact, these landscapes evolve continuously with a more or less chaotic dynamics and reflect commercial demand, social and economic needs and trends. For Antrop, sustainability is a general concept that is not easily implemented in practical work.

According to UNESCO, International Council on Monuments and Sites (ICOMOS 2010), the problems with MP are common to all properties, and several studies were consequently carried out. In the present research, we focused on rural properties, because they are non-static features and evolve continuously [15]. The socio-economic-environment changes are the main factors that affect the land uses, agricultural practices, intensification trend and the conflict between urbanization and agriculture [16]. In this context, it is difficult to maintain agricultural activity, and adopting a sustainable approach is imperative. Moreover, these sites, recognized as a cultural heritage for their distinctive agricultural system, historical crops and settlements, possess heritage values and traditional knowledge that should be preserved and offer potential qualities for future sustainable development. The conflict between UNESCO heritage and sustainable development in China was demonstrated by Wai-Yin and Shu-Yun [17]. For natural sites or protected areas, there are a number of overlapping laws and regulations implemented by a number of bodies at the federal, state and municipal levels, which contribute to their protection and conservation [18,19]. Therefore, to ensure the sustainability of rural landscapes, the definition of an MP is a fundamental step and the identification of operational actions, common measures, policies and practices is a priority. Recently, a comparative study focused on the integrity concept in UNESCO rural

landscapes was carried out by Gullino and Larcher [20]. The authors identified several parameters and demonstrated that historical and ecological parameters are considered “values to have” and that several socio-economic and management parameters are “values to maintain” in terms of the preservation and conservation of each landscape inscribed on the WHL. Regarding the management system, Badia compared two WHS, in Italy (Ferrara) and Spain (Granada), and examined the informative systems and tools, implemented by the organizations (local authorities or cultural institutions) responsible for the management of each UNESCO site [21].

2. Materials and Methods

The WHC currently includes 176 States Parties. To date (February 2015), the WHL includes 1007 properties (779 cultural, 197 natural and 31 mixed) located in 161 Countries. Overall, 46 properties are considered in danger, and two have been delisted. Analyzing the World Heritage List, we have identified the landscapes that today constitute rural World Heritage Sites. In particular, up to 2015, UNESCO has recognized 16 rural landscapes around the globe as cultural heritage sites and deemed them to be of OUV. Their characteristics are described in Table 1 and their localization in Figure 1. In the present study, only the core zone (the protected area) was considered.



Figure 1. Localization of the rural World Heritage Sites analyzed.

Table 1. Abbreviation, site name, country, inscription year, main crop and core zone property (ha) of the 16 rural World Heritage Sites (* value not available).

Abbreviation	Site Name	Country	Year	Main Crop	Property (ha)
PH-Rt	The rice terraces of Philippine Cordilleras	Philippines	1995	Rice	- *
IT-Ti	Portovenere, Cinque Terre and Islands	Italy	1997	Vineyard	4689
CU-Vv	Viñales Valley	Cuba	1999	Tobacco	-
FR-Se	Jurisdiction of Saint Emilion	France	1999	Vineyard	7847
SE-So	Agricultural Landscape of Southern Öland	Sweden	2000	Mixed	56,323

Table 1. Cont.

Abbreviation	Site Name	Country	Year	Main Crop	Property (ha)
CC-Cc	Archaeological landscape of first cultivations of coffee	Cuba	2000	Coffee	81,475
AT-Wc	Wachau Cultural Landscape	Austria	2000	Mixed	18,387
PT-Ad	Alto Douro Wine Region	Portugal	2001	Vineyard	24,600
AH-Fn	Fertő/Neusiedlersee cultural landscape	Austria-Hungary	2001	Mixed	68,369
HU-Tr	Tockaj Wine Region historic cultural landscape	Hungary	2002	Vineyard	13,255
PT-Pi	Landscape of the Pico Island Vineyard Culture	Portugal	2004	Vineyard	987
IT-Vo	Val d'Orcia	Italy	2004	Mixed	61,188
MX-Al	Agave landscape and ancient industrial facilities of tequila	Mexico	2006	Agave	35,019
CH-Lv	Lavaux, vineyards terraces	Switzerland	2007	Vineyard	898
CN-Hh	Cultural Landscape of Honghe Hani Rice Terraces	China	2013	Rice	16,603
IT-Vp	Vineyard Landscape of Piedmont: Langhe-Roero and Monferrato	Italy	2014	Vineyard	10,789

Jansen-Verbeke and McKercher observed that the traditional agricultural landscapes are unique with respect to their morphology, history, habitat and, as consequence, with respect to their cultural and economic resources and uses [22]. In order to evaluate UNESCO sustainability, a comparative study of the nomination files and management plans of the studied landscapes was carried out. The evaluation of the presence of a specific MP was the first step in this approach.

As regards ensuring sustainability over time, the actions and strategies applied by each UNESCO rural site were identified and analyzed. With the aim to evaluate how UNESCO goals are translated into management projects, we decided to compare these goals with the different actions and strategies applied at the 16 sites analyzed. Moreover, to explore the conservation of each rural site, the reports about the state of conservation (SOC) over time were analyzed over time.

Table 2 reports the UNESCO documents analyzed in this paper and the kind of information acquired. In this research, we decided to consider only the OUV elements linked to natural/agricultural/landscape features and to indicate only the governance responsible for landscape and agricultural activities. The rural sites analyzed are recognized by UNESCO for their agricultural, natural and landscape features.

Analyzing the MP, we identified the measures and plans for sustainability. The purpose of a specific MP is to preserve, explore and integrate into development practices all of the values forming the basis for inscription on the World Heritage List and therefore to establish and control the institutional system for the management of World Heritage property. Table 3 lists the seven UNESCO goals for drawing up an MP.

The list reported in Table 3 indicates that all of the goals consider human activity, but that each does so from a different perspective. The analyses of the UNESCO goals showed that two measures can be distinguished: protective-conservative (1-2-3-4) and strategic-development (5-6-7).

Table 2. List of the UNESCO documents analyzed and related information acquired. WHC, World Heritage Convention. OUV, outstanding universal value.

UNESCO Documents	Information Acquired
World Heritage List	Number of rural World Heritage Sites (till February 2015)
WHC Nomination file	For each rural site analyzed: Identification of the cultural property
	- Characteristics (site name, country, inscription year, main crop and surface of core zone property)
	- Justification for inscription and criteria
Management Plan	- Identification of OUV elements and related objectives
	For each rural site analyzed:
	- Recognition of the responsible management authority
Periodic Reporting	- Identification of measures, plans, strategies and actions for ensuring sustainability over time
	For each rural sites analyzed:
	- State of conservation
Periodic Reporting	For the rural sites (PH-Rt, CU-Vv, CC-Cc, AT-Wc, AH-Fn and MX-AI)
	- Adoption of retrospective statements of OUV
	For the rural site (PH-Rt)
	- Justification for inscription on the World Heritage List in danger

Table 3. List of UNESCO goals for the policy of cultural heritage management.

UNESCO GOAL *	Identification
Mitigating impacts on endangered sites	1
Preventing destruction of sites and dispersal of artefacts by denying permits to exploiters seeking private financial gain	2
Creating local, national and international inventories of the sites	3
Protecting and interpreting sites <i>in situ</i> whenever possible	4
Excavating sites only when there are scientific objectives or interests for public enjoyment, adequate funding, professional staff and provisions for documentation, conservation, curation, reporting and publication	5
Involving the public so that people can become the guardians of their underwater cultural heritage	6
Bringing the excitement of underwater cultural sites to the public in reputable museum exhibitions, media presentations and publications	7

* Elaborated from UNESCO instructions [4].

3. Results

Analyzing the nomination files published for each UNESCO site, the “uniqueness” elements according to the inscription criteria and the specific critical issues were reported (Table 4) [23]. We can observe that all of the rural sites analyzed are cultural landscapes that have been subjected to constant changes and development pressures. Moreover, several macro emergencies, critical issues and pressures exist, and some factors that affected these properties are similar. The most rural sites analyzed (PH-Rt, IT-Ti, CC-Cc, AT-Wc, PT-Ad, PT-Pi and MX-Al) have problems linked to the deterioration of the cultivation or production systems. In particular, wall or terrace deterioration and land fragmentation are the most common critical issues. The vulnerability of the main crop or traditional production system, both linked to socio- and economic pressures, is perceived for PH-Rt, CU-Vv, CC-Cc, HU-Tr and CN-Hn. The rural sites (SE-So, AH-Fn, HU-Tr, IT-Vo) characterized by a mosaic of land uses (crops, natural areas, forest, pastures and meadows) are affected by landscape homogenization. Furthermore, the rural sites characterized by typical terraces or structures (IT-Ti, PT-Ad, CH-Lv) show erosion problems that involve hydrological and geological instabilities.

Analyzing Table 4, we can observe that all rural sites are characterized by specific and OUV elements. For example, although IT-Ti, PT-Pi and IT-Vp (Figure 2) are viticultural landscapes, they show distinctive features and unique elements. In fact, these sites are characterized by traditional wine growing, but the environment, the cultivation and production systems, the agricultural practices, the cultivated vineyards and the used terraces/walls are different.



Figure 2. Three viticultural landscapes, IT-Ti (**left**), PT-Pi (**center**) and IT-Vp (**right**), recognized as cultural heritage by UNESCO.

In Table 5, all of the analyzed UNESCO sites, the responsible management authority, OUV elements, objectives and strategies/actions are reported. The analyses of the documents revealed that different kinds of management authorities are responsible for the conservation and sustainable development of these properties. Among them, seven rural World Heritage Sites (CU-Vv, FR-Se, PT-Ad, AH-Fn, PT-Pi, CN-Hn and IT-Vp) are mainly characterized by archaeological sites and historically-important buildings, architecture, monuments, towns and villages.

Although a management section was always included in the nomination file document and evaluated by UNESCO, as regards the rural sites inscribed after the Budapest Declaration (2002), more strategies and actions are indicated. As reported in Table 5, in the rural sites inscribed after 2002, several actions and specific measures were applied to all OUV elements and objectives. Different actions and strategies were applied, however, in the case of the rice terraces of Philippine Cordilleras (PH-Rt) and Portovenere, Cinque Terre and Islands (IT-Ti), which were recognized as UNESCO sites in 1995 and 1997, respectively, with the aim to maintain the historical terraces (rice and vine) and conserve natural resources. In particular, with regard to PH-Rt, the first rural site recognized by UNESCO as a cultural heritage site, a management plan with operational arrangements was adopted after the inscription process. In fact, in September 2001, this cultural property, for the lack of resources, was indicated on the World Heritage List as in danger. The UNESCO Committee outlined the necessity to guarantee the monitoring processes and the sustainability of the management system. Although, several problems and emergencies already persist, after the drawing up of a specific MP, in 2012, the rice terraces of Philippine Cordilleras were not considered by UNESCO to be a critical area, and for this reason, they were removed from the danger list.

In Table 5, it is possible to identify the main OUV elements recognized by UNESCO and their relative objectives for the 16 rural landscapes analyzed. Eighty-eight percent of them are characterized by agricultural values, 81% by landscape and 44% by naturalistic values. The rural World Heritage site's objectives are listed below:

- Agriculture OUV: The valorization of the agricultural activity and the conservation of the main cultivation and traditional techniques are the most common objectives. The strategies and actions applied are mainly linked to development measures.
- Landscape OUV: Maintaining historical settlements and preserving architectural structures are the most important objectives. The actions and strategies applied are mainly linked to development and prevention measures.
- Nature OUV: The protection and conservation of floristic, faunistic, environmental, biological and forestry elements are the objectives. The actions and strategies applied are linked only to prevention measures.

With the aim to conserve and maintain agriculture, nature and landscape features, several strategies were developed. To ensure the sustainability of the rural World Heritage Sites, it is essential to guarantee the necessary resources to sustain the implementation of the Convention concerning the Protection of the World Cultural and Natural Heritage (1972) and MP through operational arrangements. From the analyses of the strategies/actions applied by each rural World Heritage Site, we identified six types of operational arrangements. Economic and agricultural valorization, relevant policies, tourism activity, communication/education and research were recognized as strategic keys for the management plan (Figure 3).

Table 4. List of UNESCO rural sites, criteria, unique elements and critical issues.

UNESCO Rural Site	Unique Elements According to Inscription Criteria	Critical Issues
PH-Rt	<p><i>The rice terraces are a dramatic testimony to a community's sustainable and primarily communal system of rice production, based on harvesting water from the forest-clad mountain tops and creating stone terraces and ponds, a system that has survived for two millennia.</i></p> <p><i>The rice terraces are a memorial to the history and labor of more than a thousand generations of small-scale farmers, who, working together as a community, have created a landscape based on a delicate and sustainable use of natural resources.</i></p> <p><i>The rice terraces are an outstanding example of land use that resulted from a harmonious interaction between people and the environment, which has produced a steep terraced landscape of great aesthetic beauty, now vulnerable to social and economic changes.</i></p>	<p>Deterioration of rice terraces;</p> <p>Vulnerability of rice cultivation and irrigation system;</p> <p>Depopulation and aging of the rice farmers;</p> <p>Crisis of rice market value</p>
IT-Ti	<p><i>The eastern Ligurian Riviera between Cinque Terre and Portovenere is a cultural site of outstanding value, representing the harmonious interaction between people and nature to produce a landscape of exceptional scenic quality that illustrates a traditional way of life that has existed for a thousand years and continues to play an important socio-economic role in the life of the community.</i></p>	<p>Deterioration of vine terraces and settlement structures;</p> <p>Soil consumption;</p> <p>Erosion (hydrological and geological problems);</p> <p>Decreasing of wine growing;</p> <p>Climate change (loss of endemic faunistic and floristic features)</p>
CU-Vv	<p><i>The Viñales Valley is an outstanding karst landscape in which traditional methods of agriculture (notably tobacco growing) have survived unchanged for several centuries. The region also preserves a rich vernacular tradition in its architecture, its crafts and its music.</i></p>	<p>Land fragmentation (about 92% of the property is of private owners);</p> <p>Vulnerability of the traditional production system;</p> <p>Reducing of water sources (climate change);</p> <p>Transport problems</p>
FR-Se	<p><i>The Jurisdiction of Saint-Emilion is an outstanding example of a historic vineyard landscape that has survived intact and active to the present day.</i></p> <p><i>The intensive cultivation of grapes for wine production in a precisely-defined region and the resulting landscape is illustrated in an exceptional way by the historic Jurisdiction of Saint-Emilion.</i></p>	<p>Abandoning of human settlements used by farmers;</p> <p>Land fragmentation;</p> <p>Loss of historical vineyards (less productive);</p> <p>Reducing biodiversity (intensification of agriculture and intensive mono-production)</p>
SE-So	<p><i>The landscape of Southern Öland takes its contemporary form from its long cultural history, adapting to the physical constraints of the geology and topography.</i></p> <p><i>Södra Öland is an outstanding example of human settlement, making the optimum use of diverse landscape types on a single island.</i></p>	<p>Increasing of intensive and modern agriculture;</p> <p>Reducing biodiversity (natural elements);</p> <p>Landscape homogenization;</p> <p>Decreasing of different land uses</p>

Table 4. Cont.

UNESCO Rural Site	Unique Elements According to Inscription Criteria	Critical Issues
CC-Cc	<i>The Archaeological landscape of the first cultivations of coffee are a unique and eloquent testimony to a form of agricultural exploitation of virgin forest, the traces of which have disappeared elsewhere in the world. The production of coffee in eastern Cuba during the 19th and early 20th centuries resulted in the creation of a unique cultural landscape, illustrating a significant stage in the development of this form of agriculture.</i>	Transport problems; Decreasing of coffee cultivation and plantations; Loss of traditional techniques and vulnerability of the production system; Deterioration of typical archaeological structures
AT-Wc	<i>The Wachau is an outstanding example of a riverine landscape bordered by mountains in which material evidence of its long historical evolution has survived to a remarkable degree. The architecture, the human settlements and the agricultural use of the land in the Wachau vividly illustrate a basically medieval landscape that has evolved organically and harmoniously over time.</i>	Wine growing and agricultural activity abandonment; Decreasing of land uses, mainly fruit growing, pastures and wine growing; Deterioration of settlement structures and vine terraces; Land fragmentation
PT-Ad	<i>The Alto Douro Region has been producing wine for nearly two thousand years, and its landscape has been molded by human activities. The components of the Alto Douro landscape are representative of the full range of activities association with winemaking: terraces, quintas (wine-producing farm complexes), villages, chapels and roads. The cultural landscape of the Alto Douro is an outstanding example of a traditional European wine-producing region, reflecting the evolution of this human activity over time.</i>	Deterioration of vine terraces and walls; Urban sprawl; Soil consumption; Erosion (hydrological and geological problems)
AH-Fn	<i>The Fertő/Neusiedlersee has been the meeting place of different cultures for eight millennia, and this is graphically demonstrated by its varied landscape, the result of an evolutionary and symbiotic process of human interaction with the physical environment.</i>	Two different ownerships, legal instruments and responsible management authorities; Urban sprawl; Decreasing of land uses and natural habitat; Decreasing of wine growing, historical wine varieties and traditional productions; Climate change (loss of endemic faunistic and floristic features)
HU-Tr	<i>The Tokaj wine region represents a distinct viticultural tradition that has existed for at least a thousand years and which has survived intact up to the present. The entire landscape of the Tokaj wine region, including both vineyards and long-established settlements, vividly illustrates the specialized form of traditional land use that it represents.</i>	Land fragmentation and diverse ownership of the property; Crisis of wine market value; Social and environmental problems; Decreasing of land uses; Increasing of urbanization; Transport problems

Table 4. Cont.

UNESCO Rural Site	Unique Elements According to Inscription Criteria	Critical Issues
PT-Pi	<p><i>The Pico Island landscape reflects a unique response to viniculture on a small volcanic island that has been evolving since the arrival of the first settlers in the 15th century.</i></p> <p><i>The extraordinarily beautiful human-made landscape of small, stone-walled fields is a testimony to generations of small-scale farmers, who, in a hostile environment, created a sustainable living and a much-valued wine.</i></p>	<p>Aging of wine growers;</p> <p>Aging of vineyard, nowadays not productive;</p> <p>Deterioration of walls;</p> <p>Crisis of wine market value;</p> <p>Loss of traditional features related to wine growing and wine production process</p>
IT-Vo	<p><i>The Val d'Orcia is an exceptional reflection of the way the landscape was re-written in Renaissance times to reflect the ideals of good governance and to create aesthetically-pleasing pictures.</i></p> <p><i>The landscape of the Val d'Orcia was celebrated by painters from the Siennese School, which flourished during the Renaissance. Images of the Val d'Orcia, and particularly depictions of landscapes where people are depicted as living in harmony with nature, have come to be seen as icons of the Renaissance and have profoundly influenced the development of landscape thinking.</i></p>	<p>Increasing of urbanization and urban sprawl;</p> <p>Abandoning of mixed agriculture;</p> <p>Decreasing of some land uses (meadows and pastures);</p> <p>Intensification of modern agricultural activity;</p> <p>Land fragmentation</p>
MX-AI	<p><i>The cultivation of agave and its distillation have produced a distinctive landscape within which is a collection of fine haciendas and distilleries that reflect both the fusion of pre-Hispanic traditions of fermenting mescal juice with the European distillation processes and of local and imported technologies, both European and American.</i></p> <p><i>The collection of haciendas and distilleries, in many cases complete with their equipment and reflecting the growth of tequila distillation over the past two hundred and fifty years, are together an outstanding example of distinct architectural complexes that illustrate the fusion of technologies and cultures.</i></p> <p><i>The agave landscape exemplifies the continuous link between ancient Mesoamerican culture of the agave and today, as well as the contour process of cultivation since the 17th century, when large-scale plantations were created and distilleries first started the production of tequila. The overall landscape of fields, distilleries, haciendas and towns is an outstanding example of a traditional human settlement and land use, which is representative of a specific culture that developed in Tequila.</i></p> <p><i>The Tequila landscape has generated literary works, films, music, art and dance, all celebrating the links between Mexico and tequila and its heartland in Jalisco. The Tequila landscape is thus strongly associated with perceptions of cultural significance far beyond its boundaries.</i></p>	<p>Land fragmentation;</p> <p>Deterioration of tequila production structures;</p> <p>Intensification of new and modern techniques for tilling;</p> <p>Declining of tequila production process;</p> <p>Decreasing of agave cultivation;</p> <p>Ageing of agave farmers</p>

Table 4. Cont.

UNESCO Rural Site	Unique Elements According to Inscription Criteria	Critical Issues
CH-Lv	<p><i>The Lavaux vineyard landscape demonstrates in a highly visible way its evolution and development over almost a millennium, through the well-preserved landscape and buildings that demonstrate a continuation and evolution of longstanding cultural traditions, specific to its locality.</i></p> <p><i>The evolution of the Lavaux vineyard landscape, as evidenced on the ground, illustrates very graphically the story of patronage, control and protection of this highly-valued wine-growing area, all of which contributed substantially to the development of Lausanne and its region and played a significant role in the history of the geo-cultural region.</i></p> <p><i>The Lavaux vineyard landscape is an outstanding example that displays centuries of interaction between people and their environment in a very specific and productive way, optimizing the local resources to produce a highly-valued wine that was a significant part of the local economy. Its vulnerability in the face of fast-growing urban settlements has prompted protection measures strongly supported by local communities</i></p>	<p>Erosion (hydrological and geological problems);</p> <p>Urban sprawl;</p> <p>Land fragmentation</p>
CN-Hh	<p><i>The Honghe-Hani terraces are an outstanding reflection of elaborate and finely-tuned agricultural, forestry and water distribution systems that are reinforced by long-standing and distinctive socio-economic-religious systems.</i></p> <p><i>The Honghe Hani Rice terraced landscape reflects in an exceptional way a specific interaction with the environment mediated by integrated farming and water management systems and underpinned by socio-economic-religious systems that express the dual relationship between people and gods and between individuals and community, a system that has persisted for at least a millennium, as can be shown by extensive archival sources.</i></p>	<p>Deterioration of rice terraces;</p> <p>Vulnerability of the integrated farming, forestry and irrigation systems;</p> <p>Depopulation and aging of the rice farmers;</p> <p>Crisis of red rice market;</p> <p>Planning problems;</p> <p>Urban sprawl</p>
IT-Vp	<p><i>The cultural landscapes of the Piedmont vineyards provide outstanding living testimony to winegrowing and winemaking traditions that stem from a long history and that have been continuously improved and adapted up to the present day. They bear witness to an extremely comprehensive social, rural and urban realm and to sustainable economic structures. They include a multitude of harmonious built elements that bear witness to its history and its professional practices.</i></p> <p><i>The vineyards of Langhe-Roero and Monferrato constitute an outstanding example of man's interaction with his natural environment. Following a long and slow evolution of winegrowing expertise, the best possible adaptation of grape varieties to land with specific soil and climatic components has been carried out, which in itself is related to winemaking expertise, thereby becoming an international benchmark. The winegrowing landscape also expresses great aesthetic qualities, making it an archetype of European vineyards</i></p>	<p>Land fragmentation and diverse ownership of the property;</p> <p>Political problems;</p> <p>Decreasing of rare vines cultivated;</p> <p>Loss of historical vineyards (less productive);</p> <p>Increasing of other non-traditional cultivations (e.g., hazelnut)</p>

Table 5. List of UNESCO rural sites, responsible management authorities, OUV elements, objectives and strategies and actions.

UNESCO Rural Site	Responsible Management Authority	OUV Elements	Objectives	Strategies/Actions
PH-Rt	Ifugau Cultural Heritage Office	Landscape	Maintaining rice terraces and rice cultivation	Developing policies and laws to protect; Supporting farmers and founding source for the management of agricultural activity, water resource, restoration of damaged rice terraces, construction of protection walls; Developing participatory approach (stakeholders involvement); Encouraging sustainable tourism
IT-Ti	Parco Nazionale delle Cinque Terre	Landscape Nature	Maintaining vine terraces and settlement structures Conserving natural resources (flora and fauna)	Increasing tourism; Binding forces on all properties and buildings of landscape and historic interest; Promoting education; Improving the uniformity of the tourism offer; improving the accommodations as an alternative to hotels; improving the network of transport; improving the quality of tourism information; Developing participatory approach
CU-Vv	Consejo Nacional de Patrimonio Cultural	Agriculture; Landscape	Valorizing tobacco cultivation; Maintaining traditional techniques; Protecting vernacular architecture (farms and villages)	Increasing tourism
FR-Se	Syndicat Intercommunal à Vocation Multiple (SIVOM)	Agriculture; Landscape	Valorizing winegrowing and wine production; Maintaining historical settlements used by vineyard workers	Increasing tourism
SE-So	The National Environmental Protection Agency	Agriculture; Nature	Maintaining traditional techniques and land uses; Valorizing agricultural activity; Protecting agricultural enterprises; Conserving natural and environmental resources	Strengthening local cultural identity; Supporting farmers and founding source for the management of agricultural activity; Developing urban planning strategies regarding new buildings

Table 5. Cont.

UNESCO Rural Site	Responsible Management Authority	OUV Elements	Objectives	Strategies/Actions
CC-Cc	Provincial Cultural Heritage Centres and Santiago City Curator's Office	Agriculture; Landscape	Valorizing coffee cultivation and production; Maintaining traditional techniques; Preserving architectural and archaeological material related to 171 old coffee plantations; Safeguarding the infrastructure for irrigation and water management	Financing programs
AT-Wc	Office of the Lower Austrian Provincial Government	Agriculture; Landscape; Nature	Valorizing wine and fruit growing (apricot cultivation); Maintaining vine terraces and settlement structures; Protecting the nature and the regional Natural Park	Intensifying of viticulture, enlarging viticulture surfaces and intensifying existing vine cultures; Increasing agriculture activity in residual and collective areas and farmland; Reorganizing vine terraces; Limiting forest growing and woodland ; Increasing the tourism activity and culture; Promoting education and communication
PT-Ad	Intermunicipal Plan for the Alto Douro Wine Region	Agriculture; Landscape	Maintaining traditional techniques; Preserving ancient production techniques (porto wine); Enhancing vine terraces and settlement structures; Conserving and rehabilitating schistous stone walls and socialcos	Encouraging sustainable tourism; Supporting farmers and founding source for the management of viticulture activity
AH-Fn	Verein Welterbe Neusiedlersee (Austria); Fertő-táj Világörökség Magyarországi Tanácsa Egyesület (Hungary)	Nature; Agriculture; Landscape	Conserving natural habitat (flora and fauna); Preserving different agricultural land uses (meadows and grasslands); Increasing vineyards; Maintaining the architectural traditions of the settlements in connection with the land use	Encouraging sustainable tourism; Involving private owners, farmers and communities in the decision making processes through participation analysis; Safeguarding the structure and extension of the settlements; Increasing the local economy's population-retaining capacity

Table 5. Cont.

UNESCO Rural Site	Responsible Management Authority	OUV Elements	Objectives	Strategies/Actions
HU-Tr	Bükki; National Park Directorate	Agriculture; Landscape	Valorizing winegrowing; Sustaining traditional land uses; Maintaining traditional winemaking and historical wine cellars	Financing programs; Local and national planning
PT-Pi	Regional Secretary for Agriculture and Fishery	Agriculture; Landscape; Nature	Valorizing winegrowing; Maintaining traditional winemaking, historical wine cellars, manor houses, warehouses, tide wells, ports and ramps; Preserving natural and volcanic values	Improving wine quality; Reconvertng and restructuring of vineyard/planting new vineyards (economic support); Adopting measures that permit the maintenance of the most relevant characteristics from the cultural, natural and landscapist aspects; Establishing financial support systems applicable to private structures that are ruins; Developing participatory strategies; Promoting sustainable cultural tourism activity
IT-Vo	Val d'Orcia Park	Agriculture; Nature	Maintaining agrarian and pastoral landscapes; Maintaining different cultivations; Decreasing land abandonment phenomena; Conserving farmhouses; Safeguarding natural elements	Monitoring land use changes; Controlling residential spread moreover in the historical center; Valorizing the primary and secondary products; Developing economic strategies for improving the food quality and the origin denomination; Promoting tourism activity
MX-AI	State of Jalisco and Municipalities	Agriculture; Landscape	Protecting the traditional techniques for tilling; Protecting the traditional processes for the production of tequila; Valorizing the haciendas and the ancient distilleries; Preventing traditional processes (fermentation and distillation); Maintaining the architectural traditions of the agave settlements	Protecting the International Origin Denomination of Tequila; Improving the quality of life of the inhabitant communities; Stimulating a sustainable regional growth supported by the local cultural values; Financing programs to support economic income

Table 5. Cont.

UNESCO Rural Site	Responsible Management Authority	OUV Elements	Objectives	Strategies/Actions
CH-Lv	Inventaire fédéral des paysages, sites et monuments naturels	Agriculture; Landscape	Valorizing wine growers and winegrowing; Safeguarding vineyard plots; Protecting ancient vine terraces	Managing research and culture strategies; Valorizing the wines produced and developing landscape labelling as a socio-economic strategy; Optimizing production techniques; Promoting tourism and local crafts activities; Increasing the transports; Involving local stakeholders in a participatory approach; Developing site's communication strategies
CN-Hh	Hani Rice Terraces Cultural Heritage Protection and Development Management Committee	Agriculture; Nature; Landscape	Protecting rice cultivation and farmers; Protecting forestry areas (biological diversity); Protecting cultural relics and maintaining rice terraces, settlement structures and irrigation systems; Conserving traditional villages and residences and the traditional culture in the region	Maintaining the rights and interests of agricultural production; Increasing farmers' income; Promoting the healthy development of agriculture and the rural economy; Developing a series of customary laws for managing natural resources and solving conflicts; Protecting and supervising forestry and water resources; Prohibiting adding non-agricultural construction in cities, towns and villages within the basic farmland protection zones; Formulating specific plans for tourism management and development; Encouraging sustainable tourism; Examining and controlling new construction projects
IT-Vp	Cultural Heritage Ministry, Management Association groups and Municipalities	Agriculture	Valorizing winegrowing; Safeguarding vines cultivated and rare grape varieties; Maintaining traditional winemaking and historical wine cellars	Developing a series of customary laws (regional and national level); Protecting environmental resources, natural habitat and biodiversity; Delimiting wine production area (origin denomination); Defining grape growing regulations and specific production disciplinary for different wines with Controlled and Guaranteed Designation of Origin (DOCG) (BaroloDOCG, Barbaresco DOCG, Barbera d'Asti DOCG, Barbera del Monferrato Superiore DOCG and Asti DOCG); Developing economic strategies for valorizing winemakers and wine production (labelling)

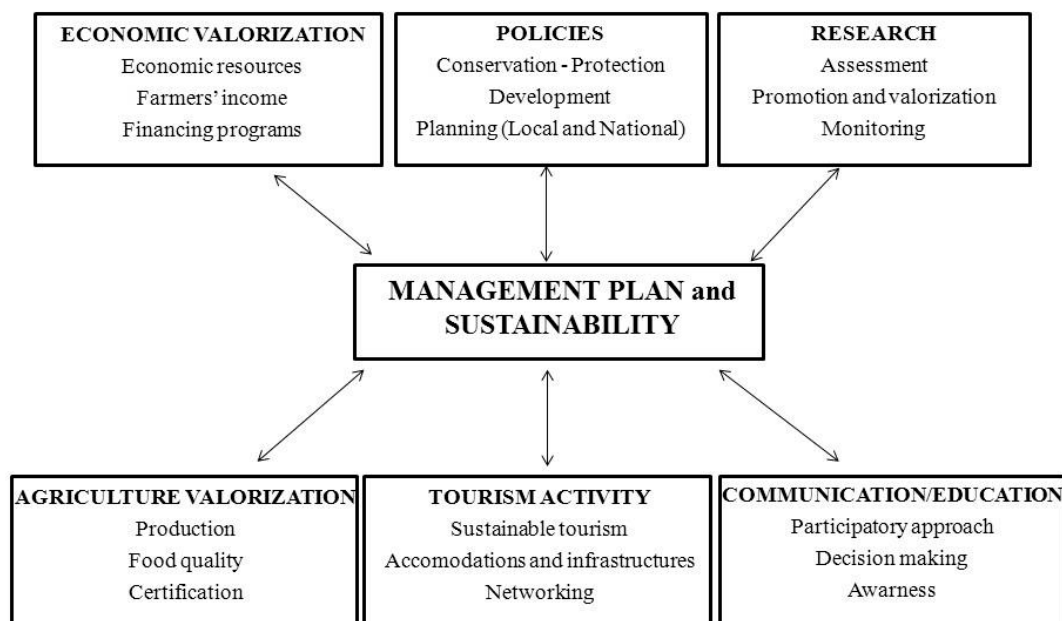


Figure 3. Types of operational arrangements identified.

3.1. Economic Valorization

Financing farmers' income and programs and founding economic resources are the way to support agricultural activity. In fact, for maintaining the traditional crop and historical cultivation system and techniques over time, it is important to increase the local economy's population and to establish financial support to private farmers. The PH-Rt, SE-So, AH-Fn, PT-Pi and CN-Hn sites supported private farmers and founded sources for the management of agricultural activity. Furthermore, the historical settlements (AH-Fn), terraces and walls (PH-Rt) linked to the main crop are supported by specific programs. To protect rice cultivation and farmers, the Cultural Landscape of Honghe Hani Rice Terraces (CN-Hn) adopted several strategies (supporting farmers' income, maintaining agricultural production's rights and interest and promoting rural economy).

3.2. Agriculture Valorization

The enhancement of production toward its primary and secondary products, optimizing the food quality and developing strategies to certify and guarantee the origin of the production were identified as operational actions. CH-Lv and IT-Vp developed socio-economic strategies, such as landscape labelling for the valorization of the wines produced in a protected area. For protecting traditional techniques and processes for the production of tequila, the agave landscape and ancient industrial facilities of tequila defined a specific protocol and area production (International Origin Denomination of Tequila).

3.3. Policies

Conserving/protecting, developing and planning are the means to ensure natural, landscape and agricultural values. In fact, conservation and protection measures and development policies are generally applied together. Four rural sites (PH-Rt, PT-Pi, CN-Hn and IT-Vp) developed a series of customary laws to protect agricultural activity, rural landscape and natural elements. Action planning (local and

national) is important, especially for the IT-Ti, SE-So, HU-Tr, IT-Vo and CN-Hn sites. For safeguarding the historical center (IT-Vo) and controlling urban and residential sprawl, specific urban plans were adopted. CN-HN's urban planning avoided the construction, in cities, towns and villages, of new buildings within the basic farmland protection zones.

3.4. Tourism Activity

Ensuring sustainable tourism, improving the accommodation offer and providing transport networks and infrastructure are the most common actions applied. Moreover, increasing tourism activity is considered by almost all of the rural sites analyzed to be the best strategy, but this is implemented differently. The PH-Rt, PT-Ad, AH-Fn, PT-Pi and CN-Hn sites encouraged sustainable tourism, as well as a mechanism to control infrastructure developments. In this context, to ensure sustainable tourism activity, the development of an integrated tourism management plan in close cooperation with the local communities is imperative.

3.5. Communication/Education

Developing a participatory approach, involving local stakeholders in decision making processes and increasing local awareness should always be applied. As regards the Portovenere, Cinque Terre and Islands site, the World Heritage Committee (2008) outlined the importance of involving all stakeholders, including local communities, to limit socio-economic pressure and promote knowledge of traditional land uses.

3.6. Research

Promoting knowledge, valorizing natural, landscape and agricultural values and evaluating objectives and strategies/actions should always be monitored and controlled. In terms of ensuring the sustainability of rural World Heritage Sites, research is an indispensable process.

4. Discussion

In the present work, the rural WHS analyzed are characterized by historical features, agricultural systems, traditional crops, local products, land use and agricultural practice permanence and the presence of architecture related to agricultural activity. These elements should be managed and preserved over time as indicated in the Convention Concerning the Protection of the World Cultural and Natural Heritage (1972). Through the comparison of the UNESCO goals with actions and strategies applied by each UNESCO rural site, some important aspects emerged. All of the UNESCO goals are “translated” into different perspectives, actions and strategies.

4.1. Actions and Effects of the Operational Arrangements

The operational arrangements identified can be distinguished as short- and long-term actions with direct or indirect effects. For example, valorizing agriculture and the rural economy and encouraging tourism are short-term actions with direct effects. By contrast, developing policies can be considered a long-term action with direct effects. Instead, promoting research and communication/education are

long-term actions with indirect effects. These last strategies should always be pursued. In this context, monitoring processes should be considered not as final and static steps, but as continuative active controls. We suggest that these procedures should be integrated in the MP and eventually modify the strategic conservation program. An MP should also identify, develop and apply specific monitoring indicators for evaluating its efficacy over time. They could be considered a useful feedback instrument as well. According to von Droste [24], in the past, the interactions between human development, environment and landscape have been simple local affairs. However, the complexity and scale of these interactions are rapidly increasing. The European Landscape Convention [25] affirmed that landscape management means action, from a perspective of sustainable development, to ensure the regular upkeep of a landscape, so as to guide the changes that are brought by socio-, economic and environmental processes. All of the rural sites analyzed are characterized by traditional and historical landscape and agricultural features, but are continually subject to socio-economic pressures. In this context, to preserve their history and nature and to ensure the presence of OUV elements over time, dealing with current trends is imperative.

4.2. The Dynamic Preservation and Conservation

To ensure sustainability, the monitoring of strategic objectives, actions, projects and resources should be dynamic. As first, the Val d'Orcia site (IT-Vo) has developed an integrated system of monitoring. This procedure, based on the universal values of the UNESCO site, identified sustainable development objects and established plans and programs for achieving them over time. According to Jansen-Verbeke and McKercher [22], "dynamic preservation" and multidisciplinary studies are essential methodologies for planning and managing sustainable heritage landscapes. Only through the continuity of planning, programming and financing is it possible to support the conservation, development and dissemination of the values of rural World Heritage Sites for future generations. With the aim to safeguard and support the world's agricultural heritage systems, in 2002, FAO started an initiative for the "dynamic conservation" of Globally-Important Agricultural Heritage systems (GIAHS) [26]. In several countries (Algeria, Azerbaijan, Bangladesh, Chile, China, Ethiopia, India, Indonesia, the Islamic Republic of Iran, Japan, Kenya, Mexico, Morocco, Peru, Philippines, Sri Lanka, Tanzania, Tunisia and Turkey), adaptive management approaches will be developed and implemented to assist national and local stakeholders in the dynamic conservation of their agricultural heritage systems. We note that only Hani Rice Terraces (China) and the rice terraces of Philippine Cordilleras (Philippine) are also UNESCO sites. The other rural sites included in these international programs (14) are different. Regarding MPs, we can assume that the initiatives promoted by GIAHS are helpful systems for safeguarding social, cultural, economic and environmental goods and services. In fact, the combination of sustainable agriculture and rural development is an objective shared by UNESCO and GIAHS.

4.3. The Best Practices, Strategies, Actions and Measures Applied

Some sites, for example Fiji Island, not analyzed in this study, have made considerable advances in the safeguarding and management of their cultural heritage. Regarding this UNESCO site, Techera [27] explains that the limited technical and financial resources, the lack of technical expertise and weaknesses in the law are the main elements that could damage the nature of the site. Moreover, drawing up

management plans for UNESCO rural sites is a difficult process. According to Cassatella (2014), in order to manage these sites, it is necessary to have a framework of objectives, the economic, social, technical and environmental capability needed to draw up an MP and, overall, a system of monitoring and feedback [28]. The MP can be considered probably a prime condition to create more awareness about sustainability issues, but unfortunately does not provide a model to monitor the system over time. In fact, each rural landscape is characterized by “uniqueness” features, traditional, natural and historical OUV elements. The diversity among these landscapes results from land use variations that have been overlaid, refined and replaced throughout history. In this context, it is impossible to apply universal management tools. In fact, there is no standard management model that can analyze specifically the uniqueness of WHS. We think that this is the most significant challenge. Furthermore, ownership and land fragmentation can be considered critical issues. In the 16 rural sites analyzed in this paper, private and public spaces and goods coexist. In fact, in all of the agricultural landscapes studied, private areas fall into the properties (core zone). For conserving and maintaining agricultural activity at these sites, it is essential to identify specific social and economic measures. In this context, private and public authorities and several stakeholders (farmers, food producers and others local stakeholders) are also involved, and all of them should actively participate in the decision making process [29]. For sustainable planning the agricultural spaces and evaluating their future changes, La Rosa *et al.* [30] and Loupa Ramos [31] demonstrated that a participatory approach and different landscape scenarios can be used. Larcher *et al.* [32] observed that for understanding the evolution of rural areas, participatory processes and civic engagement during decision making are essential. Using foster communities’ involvement, Pranger *et al.* [33] developed a framework to guide the evaluation of policy effectiveness in social-ecological systems and to manage the natural environment in sustainable rural development context. According to different authors, community involvement and public participation can be considered as vehicles to achieve sustainable environmental and development policy goals [34–36]. Moreover, as regards the UNESCO sites, this strategy can be considered a useful measure for preserving agricultural activity and ensuring sustainability [37]. The involvement of farmers, food producers, actors, policy makers and local stakeholders should therefore be practiced both during the WHL inscription process and the MP process. To ensure the sustainability of rural World Heritage Sites and preserve OUV elements, it is essential to increase the public awareness of all stakeholders (public and private).

As Eickhout *et al.* [38] observed, agricultural trade, production and land use changes are the most important factors that will influence the future of European agricultural landscapes. Against land abandonment and the intensification trend, the conservation of mixed systems and land uses and the promotion of sustainable agricultural systems are also common priorities [39]. In particular, for the improvement of the Rural Development Policy in Europe, the competitiveness of the agricultural and forestry sectors, the increase of biodiversity and the quality of life in rural areas and encouraging diversification of the rural economy are the main goals. In terms of UNESCO rural sites, linking the rural landscape with food quality and obtained products can be considered a strategic measure. According to Vollet *et al.* [40], some emblematic landscape elements could be used to valorize and promote the products of Protected Designation of Origin. This strategy could be applied to other UNESCO agricultural sites, to enhance traditional agricultural systems and historical production techniques.

Using an analytical approach, Li *et al.* [41] studied the major issues that challenge the sustainability of World Heritage Sites in China. This study, based on geographical tools, outlined the negative impacts that population pressure places on the authenticity and integrity of WHS. In fact, the tourism phenomena affects the local community's life, the way of life and the social structures drastically. Deegan [42] demonstrated that local and community involvement in the management of World Heritage Sites is necessary to ensure the long-term sustainability of these sites and, in general, of the concept of World Heritage. Several authors recognized a conflict between heritage protection and tourism development and identified the need to develop policies and effective management strategies [43,44]. According to Wager, it is important to achieve a balance between the strict protection of natural, landscape and agricultural features and tourism, urban and rural development of UNESCO sites. For this reason, encouraging sustainable tourism activity can be considered the best practice, for the protection and preservation of the universal value of rural World Heritage Sites over time [45]. Moreover, in rural and marginal areas, Garau (2015) outlined the importance of finding a balance between tourism development and landscape' protection. This author identified strategic actions, such as the application of new information communication technologies that will enhance the dissemination of cultural resources to facilitate cultural planning [46]. Recently, Cerutti *et al.* [47] demonstrated that sustainable tourism can support local economies and help to preserve landscape and cultural heritage. In particular, farms and holiday farms based on tourism are considered the most environmentally-sustainable activities. Nicholas and Thapa and Lourenço-Gomes *et al.* explored visitors' environmental, economic and social attitudes toward World Heritage Sites [48,49]. Their results demonstrated that the involvement of visitors and tourists as key stakeholders is a positive strategy, which can increase sustainable tourism development.

According to Viñals and Morant, for UNESCO World Heritage Sites, the management instruments do not appear to be as common and applicable. In fact, tourist and social perspectives of the relationship with the local community should be integrated into the plans [50,51]. Through the "Man and the Biosphere Programme" (MAB), UNESCO developed an integrative approach for biological diversity protection. MAB contributes to a greater involvement of human and natural science in policy planning and development. To limit the conflict between World Heritage and local values and the tensions between tourism and local community, for example, in Mata Atlântica Biosphere Reserve in Brazil, UNESCO site, ecotourism was encouraged [41].

The analyses of the UNESCO documents highlighted that the sustainability of UNESCO rural sites can be ensured through the evaluation of several parameters and by the definition of an integrated planning (strategic objectives, actions and projects) system. Badia outlined the need to include managerial aspects in UNESCO' MPs, as well [21].

Nowadays, international studies are carried out and published about UNESCO cultural heritage sustainability. According to Wai-Yin and Shu-Yun (2004) and Miccoli (2014), the concept of sustainability is related to economic, social and environmental values [7,17]. The strategies, actions and best practices provided by UNESCO sites' MPs are linked to ensure economic and social sustainability. By contrast, the environmental condition is indirectly considered only in policies for nature conservation.

In conclusion, we can state that a specific tourism management plan and realistic view on the comparative advantages of tourism development should be integrated into the MP. Landscapes are dynamic features, but what remains unclear, however, is how the sustainable concept can assume concretely a dynamic character and, moreover, if peoples' awareness changes through generations.

The rural sites analyzed are recognized by UNESCO for their tradition and history. The future of these sites is not always sure and positive. According to Botequilha Leitão and Ahern (2002), the sustainability of rural landscapes should be seen as a direction, rather than a concrete goal [52]. In this paper, we focused on assessing and monitoring the sustainability of rural World Heritage Sites, and our results could be useful for the implementation of existing plans and processes for drawing up MPs of future UNESCO cultural heritage. We argue that the identified operational arrangements will contribute also to advance World Heritage Sites planning and future development towards the sustainability concept.

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Author Contributions

Paola Gullino collected and analyzed the data and wrote the paper. Gabriele Loris Beccaro contributed to the analysis. Federica Larcher conceived of the research project and wrote the paper.

Conflicts of Interest

The authors declare no conflict of interests.

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