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Exploring the role of Globally Important Agricultural Heritage Systems in integrated landscape approaches

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ABSTRACT. The simplification of agricultural landscapes is a major factor in eroding the relational values connecting communities and their environments. Integrated landscape approaches help address these issues but struggle to balance conservation and production in agricultural systems. Globally Important Agricultural Heritage Sites (GIAHS) focus on preserving agricultural heritage in areas where traditional farming practices have maintained high agrobiodiversity and ensured food and livelihood security. These sites share features such as mosaic landscapes, community-based use of resources, and cultural traditions related to seasonal farming events, yet little is known about what sustains them today. This study aims to identify and classify key attributes of heritage farming systems to better understand their functioning as integrated landscape approaches. Using a Q-survey based on 34 statements and three open questions, we examined key features of heritage agricultural systems, the impacts of the GIAHS designation, and the challenges faced by local farming systems. We collected 31 responses from GIAHS community members, including experts and researchers, and identified four categories of GIAHS. Category 1 focused on product certification, category 2 was centered on producing staple foods with short marketing channels, and category 3 focused on exports. Category 4 was centered on traditions, cultural values, and reducing the impacts of climate change. Respondents shared that the designation was especially beneficial for creating awareness and stimulating policies for heritage and ecosystem preservation. It was also reported that land abandonment, the aging population, and climate change are common challenges faced by heritage farming systems. This study suggests that GIAHS share several elements with integrated landscape approaches, such as their focus on dynamic conservation, multifunctional land uses, and multi-level stakeholder engagement and their unique focus on heritage preservation may help to bridge conservation and production goals in agricultural systems.

Key Words: *farming; GIAHS; heritage agriculture; integrated landscape approaches; landscape products*

INTRODUCTION

Wide-spread standardization of agricultural practices and products, driven by a preference for large-scale markets, is contributing to a decline in multifunctional agricultural landscapes and eroding the relational values that connect communities to their local environments (Riechers et al. 2020, Estrada-Carmona et al. 2024). As traditional land management practices decline, so do culinary traditions and locally adapted crops that promote agrobiodiversity and preserve local cultural heritage (Díaz et al. 2019). Integrated landscape approaches have been employed globally to address complex problems by integrating social, ecological, and economic interests (Van Vianen et al. 2015). These approaches have also been employed to manage mosaic landscapes where conservation and production activities coexist (Sayer et al. 2013, Torralba et al. 2023). However, a recent literature review on the topic (Vermunt et al. 2020) indicated that rural areas often struggle to effectively implement these strategies because of limited stakeholder engagement, insufficient knowledge, experience, and skills, as well as inadequate cooperation between local and national entities.

One under-investigated approach to integrated landscape management that aims to address these issues is the Globally Important Agricultural Heritage Systems (GIAHS) program, established by the United Nations Food and Agriculture Organization (FAO). GIAHS are defined as "remarkable land use systems and landscapes which are rich in globally significant biological diversity evolving from the co-adaptation of a community with its environment and its needs and aspirations for sustainable development" (Koohafkan and Altieri 2011, FAO 2022).

GIAHS share similarities with other programmes, such as UNESCO's World Heritage Sites (FAO 2015), Biosphere Reserves (Estrada-Carmona et al. 2024), and Long Term Socioecological Research (LTSER) platforms (Haberl et al. 2006). Besides meeting other social and ecological objectives, the focus of GIAHS is on maintaining food and livelihood security, while fostering economic and agricultural development in multifunctional farming systems with unique agricultural heritage (Koohafkan and Altieri 2011, Koohafkan and dela Cruz 2011). Although agricultural heritage systems are of major importance for providing food security in rural areas (Barthel et al. 2013), little is known about the specific characteristics that enable these systems to remain active and sustainable today.

The aim of this study is to identify and classify the characteristics of agricultural heritage systems to better understand their functioning as a particular integrated landscape approach. Based on a global Q-survey that captures the perspectives of the GIAHS community, we raise the following research questions: What are the key attributes that support food production in GIAHS? What are the impacts of the GIAHS designation? What are the current challenges of local agricultural heritage systems? In the discussion, we will explore how such heritage-centered approaches can enrich the broader discourse on integrated landscape approaches.

Background

Globally Important Agricultural Heritage Systems (GIAHS) are dynamic social-ecological systems where traditional agricultural practices, food production, and local cultures are interlinked for conservation and sustainable management. Along with one

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composite criterion of global significance, GIAHS sites are designated based on the following five criteria: (1) food and livelihood security, (2) agrobiodiversity, (3) local and traditional knowledge systems, (4) cultures, value systems, and social organizations, and (5) landscapes and seascapes features (Fernandez et al. 2020). These systems emphasize dynamic conservation, which sustains the coevolution of ecosystems and sociocultural patterns, creating agrobiodiversity and culture-rich landscapes managed by local farmers (Agnoletti and Santoro 2022).

GIAHS reflect both tangible (e.g., landscape features, species preservation) and intangible (e.g., management practices, cultural traditions) aspects of heritage. These interrelated facets of heritage are represented by biophysical elements (such as plant and animal species) that are influenced and altered through human interventions and landscape management strategies. They are applied through the lens of local traditional ecological knowledge, creating place-based memories that are transmitted across generations and inform local culture, traditions, and community networks (Lindholm and Ekblom 2019).

The concept of a designation based on agricultural heritage originates in the 2002 World Summit on Sustainable Development (FAO 2022). Eight inaugural GIAHS sites were designated in 2008 in six countries by FAO and financially supported by the Global Environment Facility (GEF 2007). In 2015, the GIAHS initiative was incorporated into the regular FAO program (FAO 2022). Although most GIAHS sites are located in Asia, where regional and national networks exert considerable efforts to preserve heritage agricultural areas (Nagata and Yiu 2021), the concept has also been successfully implemented in other regions. By 2025, as shown in Table 1, 102 sites in 29 countries had been designated (FAO 2025).

Table 1. The number of Globally Important Agricultural Heritage Systems (GIAHS) sites per Food and Agriculture Organization macroregion (FAO 2025).

FAO region	Number of countries containing GIAHS	Number of GIAHS
Africa	3	4
Asia and the Pacific	10	65
Europe and Central Asia	6	15
Latin America and the Caribbean	4	9
Near East and North Africa	5	9

The GIAHS designation process is overseen by a Scientific Advisory Group appointed by the FAO, with biennial member exchanges. Although the application process for the designation varies, many countries have established national entities (e.g., agricultural ministries and agencies) to support local groups (e.g., consortia of local governments and NGOs) in navigating the application process. The GIAHS idea is strengthened by international GIAHS networks, such as the East Asia Research Association for Agricultural Heritage Systems (ERAHS; Yiu et al. 2022) and the Mediterranean GIAHS (MED-GIAHS 2024). The involvement of local and national governments in managing the site varies among locations. Some sites employ a bottom-up approach to governance where local entities play a primary role in the site management, with the government serving as an intermediary between them and national and international institutions (Sekine 2022). In other sites, land tenure, access to resources, and types of economic activities are managed more strictly by the local government (Gu et al. 2012, Lee et al. 2022).

GIAHS are expected to base their economic sustenance on agricultural trade and markets (FAO 2025). Farmers are encouraged to develop strategies that enhance the value and marketability of local products, and communicate the benefits of traditional agriculture based on sustainable, small-scale practices (Siyuan et al. 2020, Wenjun et al. 2021). Alternative financing strategies may be available on a voluntary basis and depend on the local structures supporting the GIAHS designation, as well as partnerships established with the public and private sectors (Jiao et al. 2022). On the basis of this voluntary model, only a few countries have provided funds for the monitoring of their GIAHS sites, while many other sites rely on project-based funding options to further investigate the benefits and challenges affecting the designated areas (Jiao et al. 2022).

The GIAHS designation aims to achieve several outcomes. First, it aims to raise awareness of heritage agricultural areas and their conservation through partnerships with national and regional governments. Second, capacity building is promoted through training and workshops for farmers, as well as for students, as exemplified by the Chair of Agricultural Heritage at the University of Florence (Italy) and the newly established South-South and Triangular Cooperation (Agricultural Heritage 2024, FAO 2024). Third, GIAHS advocates for the formulation of policies and regulatory instruments that support the conservation of local ecosystems and the promotion of sustainable, place-based income sources (Koohafkan and Altieri 2011). This can happen, for example, in the form of eco-labels, payments for ecosystem services, and other incentive mechanisms for conservation (Siyuan et al. 2020, Miyake et al. 2021, Jiao et al. 2022).

GIAHS are characterized by high levels of agrobiodiversity that are skillfully managed to provide food, regulating, and cultural ecosystem services. In these systems, farming practices are diverse: in some sites, traditional land management focuses on livelihood security, while in others, traditional crops are grown mainly for personal consumption, and cash crops are produced for sale (Fuller et al. 2017, Guo et al. 2021, Wang et al. 2021). Many sites manage land to enhance multifunctionality, using techniques such as agroforestry, understory cultivation, and swidden agriculture (Fukamachi 2020, Kohsaka et al. 2021, Bai et al. 2022, Sirimanna et al. 2022). Local traditions favor the use of specific plants and ecosystems to maximize efficiency. Non-food materials, such as rice straw, are repurposed for use as fodder, construction materials, firewood, or artisanal crafts (Yang et al. 2019, Bai et al. 2022).

Community-based management of natural resources, such as water and forests, is widely implemented to enhance the stewardship of local mosaic landscapes, where diverse forms of land tenure coexist (El-Saied et al. 2015, Sarabia et al. 2021, Park et al. 2022, Sirimanna et al. 2022, Andreotti et al. 2023). Diversifying income sources, whether through crop variety or off-farm employment, is a common strategy for sustaining livelihoods and ensuring food security (Fuller et al. 2017, Vasco et al. 2024). Furthermore, heritage agricultural practices are intertwined with

a rich tapestry of cultural norms, values, traditions, and rituals that dictate the rhythm of seasonal events, festivities, and artistic expressions (Koohafkan and Altieri 2011).

METHODS

Q-survey

To investigate the dynamics of production systems in GIAHS sites, a Q-survey was distributed to a diverse cohort of GIAHS community members. The Q-survey, originally developed in the medical sciences, is widely employed in social-ecological research for its ability to reveal patterns of opinion among diverse stakeholders (Zabala et al. 2018, Dieteren et al. 2023, Langston et al. 2024). For example, it has been used to uncover different ways to approach integrated landscape management (Torralba et al. 2023), help understand stakeholder priorities in landscape planning (Jiren et al. 2023), and identify areas of conflict in changing landscapes (Milcu et al. 2014). The Q-survey captures the complexity of viewpoints, even with a relatively small sample size, by requiring participants to sort statements (or images) into a forced semi-normal distribution (Dieteren et al. 2023).

In our survey, we compiled the Q-sort statements based on a literature review of 60 empirical studies that covered 33 GIAHS sites. Because we were particularly interested in the role of food products in the functioning of GIAHS, relevant text passages pertaining to local production systems were highlighted, coded, and organized into seven main categories based on the framework established by García-Martín et al. (2021): product qualities; value chains; farming practices; ecological features; economic features; social features; and cultural features. Common themes within each category were grouped and refined to form the 34 final statements for the Q-sort (the references connected with the creation of each statement can be found in Appendix 1).

The final section of the survey included three open-ended questions (their formulation can be found in Appendix 2). The first question aimed at understanding the reasoning behind the choice of statements that were ranked highest (+4). The second and third questions focused, respectively, on the impact of the GIAHS designation on local production systems and the current challenges faced by these sites. These questions allowed respondents to elaborate and clarify their rankings in the Q-sort exercise, from most relevant (with Q-score +4) to totally irrelevant (with Q-score -4), thereby providing deeper insights into the nuances of each site's situation. The survey was hosted on the online platform Q-Sortware (Pruneddu 2013), facilitating a structured and systematic analysis of the responses. The survey was designed to be completed in approximately 30 minutes and offered in English and French.

The target population of our survey were researchers, managers, farmers, and farmer's associations that had a direct connection with a GIAHS site. We identified and invited potential participants through a review of GIAHS websites, participation in the 2024 ERAHS conference in Gifu (Japan), and use of personal networks. With this approach, we contacted about 350 experts, based on snowball sampling, which yielded 31 completed survey responses that covered 22 GIAHS sites in 13 countries, as shown in Figure 1. This sample size is within the typical sample size area of 26-46 responses of most previous Q-analyses (Zabala et al. 2018).

Recognizing the variety of stakeholders involved, from farmers to local officials, the survey was designed to incorporate multiple perspectives from each site, thereby ensuring a well-rounded understanding of the issues. Respondents were requested to identify the specific GIAHS site to which they were referring and to articulate their role within that context. Thirteen respondents indicated relations to their GIAHS sites for research purposes, seven were managers of GIAHS sites and coordinators of local community-based projects, four acted as consultants or experts, four were staff members of local farming associations, and three were farmers.

Data analysis and presentation

Data analysis was conducted using a systematic, multi-step approach to elucidate patterns of opinions within the GIAHS community. This analysis established connections between the characteristics of production systems within GIAHS and the attributes that sustain them, in alignment with the study's objective of enhancing our understanding of these agricultural heritage sites underpinned by integrated landscape approaches. A Principal Component Analysis (PCA; Zabala et al. 2018) was performed to establish the optimal number of factors to extract from the Q-sort data. A four-factor solution was selected because of its clarity and interpretive ease, providing a balanced representation of the diverse perspectives captured in the survey. The data were analyzed using the "qmethod" (Zabala 2015) package in R, with a varimax rotation applied (Zabala et al. 2018). This widely utilized technique in Q-sort analysis was chosen to maximize the variance explained by each factor, thereby facilitating straightforward interpretation. The four identified factors corresponded to distinct clusters of statements (later named "categories"), each representing different viewpoints within the GIAHS community, reflecting varying priorities and challenges associated with food production in agricultural heritage systems.

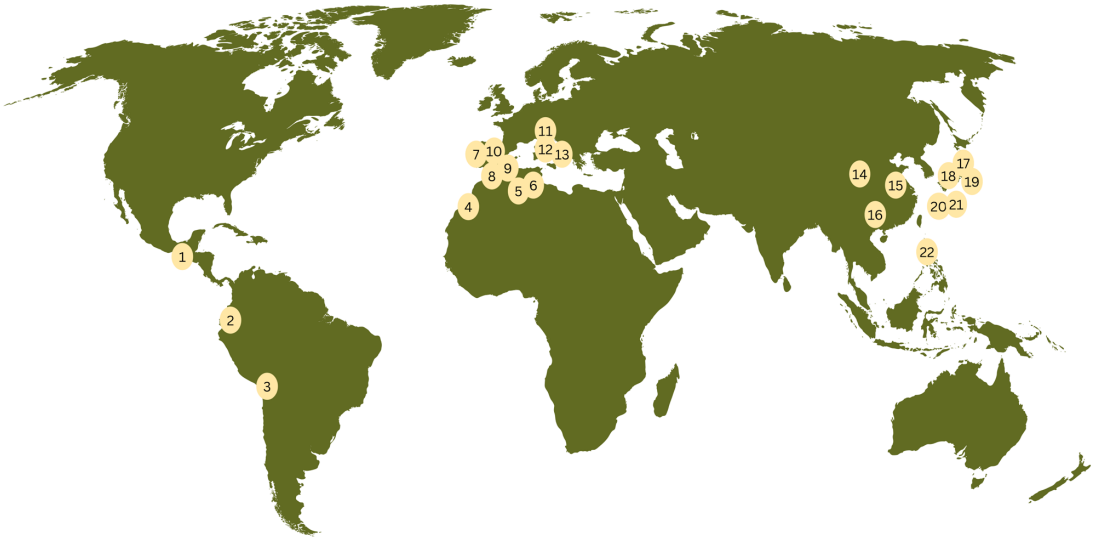
Responses to the open-ended questions were first organized according to the four clusters identified in the Q-sort analysis. Within each cluster, we examined all answers, identified recurring themes, and summarized them to contextualize and further explain the characteristics of that cluster. These qualitative insights helped illustrate how the GIAHS designation influences local production systems and what challenges these sites have faced. This approach was essential for capturing the nuanced perspectives of respondents, which might not be fully articulated through quantitative analysis alone. Finally, we illustrated each cluster with a typical GIAHS case and outlined its key attributes, perceived challenges, and the impacts of the GIAHS designation, as described in the GIAHS website profiles (FAO 2025).

RESULTS

Survey results

The analysis of the responses to the Q-survey revealed four categories of agricultural heritage systems present within GIAHS (Appendix 3). The respondents grouped in the first category highlighted sites that focused on certifying local traditional products for the local market, while also cultivating cash crops for a more stable source of revenue. In the second category, the respondents indicated farming systems that emphasize the production of staple crops valued on a national level and are still strictly intertwined with local culture. Category three focused on

Fig. 1. The sites that responded to the survey.



Latin America and the Caribbean
1. Chinampas System in Mexico
2. Andean Chakra: an ancestral agricultural system of Kichwas Cotacachi Communities
3. Andean Agriculture

Near East and North Africa
4. Argan-based agro-sylvo-pastoral system within the area of Ait Souab-Ait Monsour
5. Ghout Oasis system El Oued
6. Gafsa Oases

Europe and central Asia
7. Barroso Agro-Sylvo Pastoral System
8. Malaga Raisin Production System in La Axarquía
9. Historical Irrigation System at l'Horta de València
10. The Agricultural System of Valle Salado de Añana
11. Traditional Hay milk Farming in the Austrian Alpine Arc
12. Soave Traditional Vineyards
13. Olive Groves of the Slopes between Assisi and Spoleto

Asia and the Pacific
14. Shexian Dryland Stone Terraced System
15. Xinghua Duotian Agrosystem
16. Rice-Fish Culture
17. Sado's Satoyama in Harmony with Japanese Crested Ibis
18. Noto's Satoyama and Satoumi
19. Traditional Tea-grass Integrated System in Shizuoka
20. Takachihogo-Shiibayama Mountainous Agriculture and Forestry System
21. Kunisaki Peninsula Usa Integrated Forestry, Agriculture and Fisheries System
22. Ifugao Rice Terraces

the export of renowned products worldwide, while maintaining sustainable farming practices and collaborating with local stakeholders and visitors. The fourth category highlighted cultural practices, artistic expressions, and traditional rituals connected to farming, even in the face of climate change. The statement "4. Animals like donkeys and mules are used to carry heavy weights and to plow the fields" was deemed irrelevant (with normalized Q-scores -3 and -4) for all four categories while the statements "5. Conventional crops, chemical fertilizers and pesticides are made available by the local government" and "21. Essential nutrition is ensured at household level in the form of kitchen gardens" were ranked as not very relevant or neutral, with normalized Q-scores ranging from -2 to 0.

Category 1: Certified high-quality foods for locals and visitors

Respondents in this category indicated the statements "1. Local agri-food products hold a quality certificate (e.g. geographic indication, organic production, regional labels)" and "17. Traditional farming practices help ensure the maintenance of high agrobiodiversity" as the most relevant features. They deemed it also important that farmers cultivate cash crops to generate income (Q-score +3) while adhering to traditional land management practices (Q-score +3). Respondents also reported that these sites are characterized by many small and fragmented parcels (Q-score +3). The crops cultivated there have ancient origins (Q-score +2) and the processing of agricultural raw materials is carried out on site (Q-score +2). Local products are often featured in restaurants, shops, and guesthouses, where rural tourism is promoted as a driver of rural regeneration (Q-score +2).

Respondents mentioned that the GIAHS designation promoted a sense of pride among residents, highlighting for instance that "Family farming and traditional food culture are fundamental parts of the GIAHS." Some also believed that GIAHS improved the visibility of the sites on a national level and helped raise the profitability of agricultural products like certified olive oil (as seen in Fig. 2). Last, the respondents highlighted that the designation supports tourism, creating new income streams for farmers. It was reported that economic challenges remain, with unstable product prices and a lack of profitability of farming. Labor shortages due to an aging farming population and rural outmigration worsen the situation, leading to land abandonment. Respondents highlighted the need to attract successors and ensure farming's long-term viability.

Fig. 2. The Globally Important Agricultural Heritage Systems site of Assisi and Spoleto, in Italy (FAO 2025). Photo from FAO (2026, https://www.flickr.com/photos/giahs/albums/).

Example of category 1

Olive Groves of the Slopes between Assisi and Spoleto, Italy

Photo courtesy ©FAO/Comune di Trevi

This site is characterized by traditional farming systems based on terraces. The olive oil produced in the area holds the European certificate of Protected Designation of Origin. Sustainable tourism is encouraged with hiking trails across the terraces and with visits to historical buildings such as oil mills.

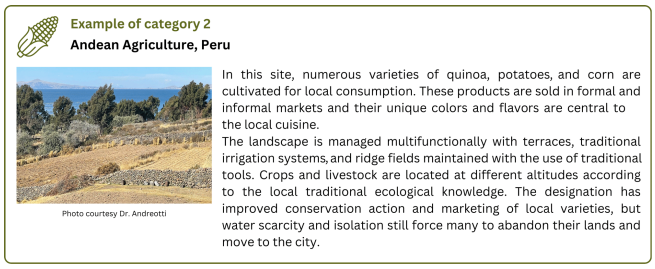
While the designation improved cooperation between stakeholders and helped increase farmers' incomes, the region still struggles with preserving traditional practices and making farming adequately profitable.

Category 2: Staple foods and the celebration of traditional crop varieties

Respondents in this category ranked the statements "13. The food produced in my GIAHS is considered a key ingredient/a staple food in the whole country" and "26. Women are involved in farming activities (e.g. in the transformation of products, selection of seeds)" as the most relevant. Local traditional crops, cultivated in the area for centuries, are known worldwide for their unique taste (Q-score +3), and traditional farming techniques help ensure high agrobiodiversity (Q-score +3). Local crops are grown in small and fragmented plots because diversifying farm crops helps maintain income and food security (Q-score +2), and local crop varieties are preserved in seed banks (Q-score +2). Apart from the locally produced staples, local traditional recipes also include wild plants (Q-score +2).

Respondents emphasized the role of the designation in preserving biocultural heritage practices, such as irrigation (as in the example in Fig. 3) and water management. It was reported that climate change poses a significant threat, with altered rainfall patterns, droughts, and soil degradation impacting crop yields. Lack of government support ("... the government has abandoned institutional programs to help poor farmer families in their family production units") and poor access to public funds, as well as geographical isolation and lack of public transport, were highlighted as the main causes of rural depopulation.

Fig. 3. The Globally Important Agricultural Heritage Systems site Andean Agriculture in Peru (FAO 2025). Photo by Dr. Andreotti.

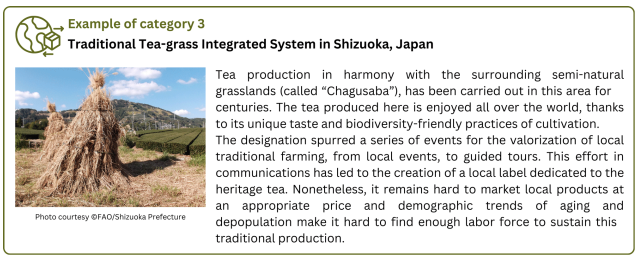


Category 3: From global to local, when farming is at the center of sustainability

Respondents in this category particularly supported to the statements "16. Some of my GIAHS's products are exported for international markets" and "2. Local crop varieties cultivated in my GIAHS are known worldwide for their unique taste." In this case, farmer's associations facilitate access to markets for local products (Q-score +3) and rural tourism is promoted as a driver of rural regeneration (Q-score +3). Some farms or farming practices are even commercialized as tourist attractions (Q-score +3). Respondents ranked as mildly relevant (Q-score +2) that social strategies for sustainability are based on short marketing channels, small and fragmented farming plots, and the sharing of expensive machinery. Some of the products from these GIAHS sites are considered key ingredients and staple foods throughout the country (Q-score +2).

Respondents mentioned that the GIAHS designation brings international recognition, as in the case of the Traditional Tea-grass Integrated System in Shizuoka (Fig. 4), strengthening policies for conservation and promoting heritage tourism. Some respondents also pointed to the economic development of the area: "Since the area has been certified as a GIAHS, related events and tours have been held, leading to the revitalization of the local economy." A lack of government support and insufficient funding for site preservation were common concerns. Respondents also pointed at climatic and socioeconomic challenges such as extreme weather events, labor shortages, and the need to enhance the market value of local products.

Fig. 4. The Globally Important Agricultural Heritage Systems site Traditional Tea-grass Integrated System in Shizuoka, Japan (FAO 2025). Photo from FAO (2026, https://www.flickr.com/photos/giahs/albums/).

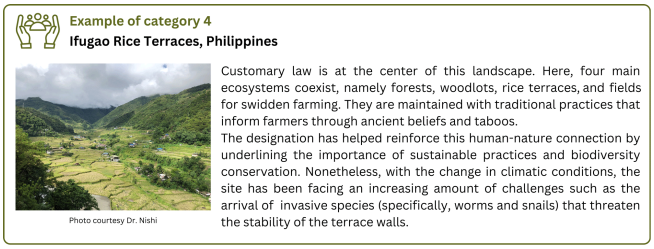


Category 4: A strong cultural identity and the need to adapt to a changing climate

The statements "22. The farming practices of my GIAHS are at the center of rituals, festivities, and various literary and artistic works" and "17. Traditional farming practices help ensure the maintenance of high agrobiodiversity" were ranked highest by respondents in this category. In the GIAHS sites within this category, farmers traditionally diversify farm products to ensure food and livelihood security (Q-score +3). However, respondents highlighted that changes in climate forced farmers to adapt by shifting their agricultural production (Q-score +3). They emphasized the tradition of sharing and sparing resources for farming and livelihoods, as farmers with larger harvests will share their surplus with those with smaller yields (Q-score +2), while byproducts from farming are used for crafting activities (Q-score +2). Farmer's associations facilitate access to markets for local products and women participate in farming activities (Q-score +2). In GIAHS sites in this category, locals also participate in the market economy, engaging in labor or contributing to the tourism industry (Q-score +2).

Whereas one respondent mentioned that the designation had not yet been fully utilized, others noted that GIAHS had validated and promoted traditional agricultural practices. These in turn fostered respondents' views of sustainability, the preservation of local ecosystems, and a harmonious human-nature relation (one respondent even noted that the designation fostered "ecological integrity"). Nonetheless, respondents highlighted that commercialized pesticides and fertilizers were threatening local agrobiodiversity while cultural traditions were undermined by urbanization, socio-cultural changes, and declining interest among younger generations, as in the case explained in Figure 5.

Fig. 5. The Globally Important Agricultural Heritage Systems Ifugao Rice Terraces in the Philippines (FAO 2025). Photo by Dr. Nishi.



DISCUSSION

Based on our findings, we argue that Globally Important Agricultural Heritage Systems (GIAHS) are prime examples of integrating food production with the conservation of natural and cultural heritage. By leveraging heritage agriculture, GIAHS have the potential to support stakeholder engagement, local to international cooperation, and capacity building activities. Although the literature reports difficulties in implementing integrated landscape approaches (Bürgi et al. 2017, Carmenta et al. 2020), especially in rural areas (Vermunt et al. 2020), GIAHS provide concrete examples of how such approaches can be implemented on the ground. However, because of their relatively recent establishment, compared to other similar initiatives, GIAHS have been overlooked in the discourse surrounding integrated landscape approaches, and it is therefore unclear exactly which factors support sustainable agricultural production in these systems. Applying a Q-Method study offers the opportunity to explore different perspectives within the GIAHS community across the world, thus uncovering a more comprehensive understanding of the dynamics at play in these specific types of integrated landscape approaches (Langston et al. 2024).

Our ambition was thus to characterize the key attributes, challenges, and impacts of GIAHS and to reflect on the insights that integrated landscape approaches offer. Based on our Q-sort survey, we identified four main categories of key attributes that define the sites. The categories are characterized by different types of agricultural heritage practices and marketing strategies employed by local communities, which promote livelihood security while preserving local heritage.

Key attributes of production systems in GIAHS

All four categories of GIAHS analyzed in this study employ multifunctional approaches to landscape management, balancing income generation with the preservation of social, ecological, and agricultural heritage values. Categories 1 to 3 underline the importance of product qualities and a value chain for local products, while category 4 presents a stronger focus on cultural features and climate change adaptation. Regarding the products and their value chains, the results showed contrasting roles of tradition and innovation, with category 2 focusing on time-tested traditional agricultural practices, and categories 1 and 3 underlining the importance of innovation. Agricultural heritage systems in category 1 use labeling as a selling point for high quality products. Category 3 focuses on sustainable innovations based on the fame of local products. These strategies resonate with the theory on landscape products and landscape-based labels, which report that context-dependent sustainability standards help support local livelihoods, promote awareness of local products, and facilitate cooperation among stakeholders on a local to global scale (Mann and Plieninger 2017, Flinzberger et al. 2020, García-Martín et al. 2022).

Category 2 sheds light on the sites whose agricultural heritage products form the basis of local diets. In this category, women actively participate in the agricultural production and are responsible for processing produce. This characteristic highlights the crucial role that small-scale farming plays in preserving local knowledge, from the field to the table, by cultivating varieties adapted to the local climate and cuisine, while maintaining high agrobiodiversity (Calvet-Mir et al. 2016). Category 4 encompasses sites with a focus on cultural features and adaptation to climate change. To ensure food security in the face of uncertain climatic conditions, a diverse range of crops is cultivated using traditional techniques. Although community cooperation, strong cultural ties to the land, and a high agrobiodiversity might be helpful in facing changing climates in the short term, Tarolli et al. (2025) suggest that in the long run, innovative strategies should be integrated in the local social-ecological landscape to promote resilience.

Benefits of the GIAHS designation

Our study revealed that the primary perceived benefits of GIAHS designation include an enhanced sense of identity and connection with the site, improved cooperation among stakeholders, and increased public interest. Respondents also indicated that it successfully led to the implementation of policies aimed at heritage safeguard. Although no further context was given on what that meant on the ground, this aspect could relate for instance to the establishment and execution of sustainable development actions, improving public policies on agrobiodiversity conservation, and slowing down land abandonment, which are the elements the respondents highlighted as benefits of the designation. These findings align with the first and third objectives of the GIAHS initiative, which aim to create awareness and develop policy and regulatory instruments (Koohafkan and Altieri 2011).

The second objective of creating capacity building through diversification and enhancement of income sources, was perceived as only partially tackled in the sites. Respondents noted that the certification of local products, such as olive oil and tea, helped communicate their value to consumers, but they did not mention learning opportunities and training for locals as an outcome of the designation. Sekine (2022) reports that product certification in GIAHS can be a useful tool to communicate farming standards and product value to consumers, but a careful approach is needed to avoid critical price increases (that therefore make the products not affordable for local markets). It is also important to still foster a landscape approach to resources management and food production, avoiding a specialization toward the crops and products that are more economically interesting, thus reducing the spectrum of local agrobiodiversity and associated traditional ecological knowledge (Sekine 2022). On the other side, Flinzberger et al. (2022), García-Martín et al.

(2021), Mann and Plieninger (2017), suggest that certification schemes may be beneficial to increase employment opportunities and facilitate stakeholder cooperation and agency, if implemented with a landscape-management perspective.

The implementation of touristic activities (besides being one of the main features of categories 1 and 3) was also mentioned as a way of creating awareness and diversifying income sources. This finding aligns with Iannucci et al. (2022), and Bourdin et al. (2019), who highlight heritage tourism as a viable solution for sustainable development in rural areas. However, together with Storey (2006), they also warn that an intensification of tourist activities in rural areas might lead to the erosion of the agricultural heritage itself, by moving toward a commodification of rural areas that is more focused on tourist development and less connected to actual agricultural production.

Challenges of the GIAHS designation

Respondents highlighted outmigration, depopulation, and the aging of residents as key challenges to preserving local heritage. At the same time, climate change and resource overuse were the most frequently mentioned biophysical causes of landscape degradation. These patterns are not unique to GIAHS, with processes of deagrarianization of rural areas occurring in several regions of the world (Rigg et al. 2012, Bryceson 2019). They are often accompanied by a restructuring of family constellations, with elderly and children left in rural areas and the parents seeking job opportunities elsewhere, often moving between urban occupations and rural homes (Bryceson 1996, Rigg et al. 2012). GIAHS have only recently started to address this challenge (Yiu et al. 2022). In Japan, for example, the overlap of the domestic Nationally Important Agricultural Heritage Sites (NIAHS) with the GIAHS designation provides the sites with support in this regard. In fact, the national designation requires extra criteria such as "Participation of various entities" (Sekine 2022). This ensures that upon designation, local actors have been activated to cooperate with other stakeholders, to provide job opportunities and address issues such as depopulation.

Climate change was identified as another pressing issue in GIAHS, with sites being forced to adapt their crop production and facing droughts and extreme weather events. To tackle this challenge, GIAHS published a monitoring and evaluation document containing guidelines for managing the sites (Yiu et al. 2022). Nonetheless, while the literature reports practical adaptation strategies, such as the introduction of micro-tiller (Guo et al. 2021, Sau-Wa Mak 2024), concrete strategies to mitigate the damages caused by climate change, remain largely unaddressed.

Integrated landscape approaches and GIAHS

Integrated landscape approaches are generally understood as a framework for land management characterized by the unique goal of reconciling various land use objectives with sustainable development and conservation of biodiversity and agrobiodiversity through the provision of a set of tools and concepts that help integrate policies and practice (Sayer et al. 2013, 2017, Reed et al. 2015). A holistic approach to landscape management characterizes them and involves the participation of cross-scale actors, often used to address complex problems (Sayer et al. 2013). Integrated landscape approaches recognize the dynamic nature of landscapes and utilize the concept of adaptive management to facilitate a participatory and feedback-based approach for creating suitable action plans (Milder et al. 2014, García-Martín et al. 2016).

GIAHS also address the complex relationship between land use, conservation, and development, and they do so by utilizing the concept of dynamic conservation (Koohafkan and dela Cruz 2011). The three objectives of the GIAHS initiative (raising awareness, capacity building, and creation of policy and regulatory instruments) paired with the five designation criteria (food and livelihood security, agrobiodiversity conservation, traditional knowledge, social and cultural values, and landscape features) enable GIAHS to focus on agricultural heritage conservation while allowing the necessary innovations (Agnoletti and Santoro 2022). Both GIAHS and integrated landscape approaches focus on process (instead of project) oriented actions with long-term sustainability impacts (Sayer et al. 2017, Reed et al. 2023).

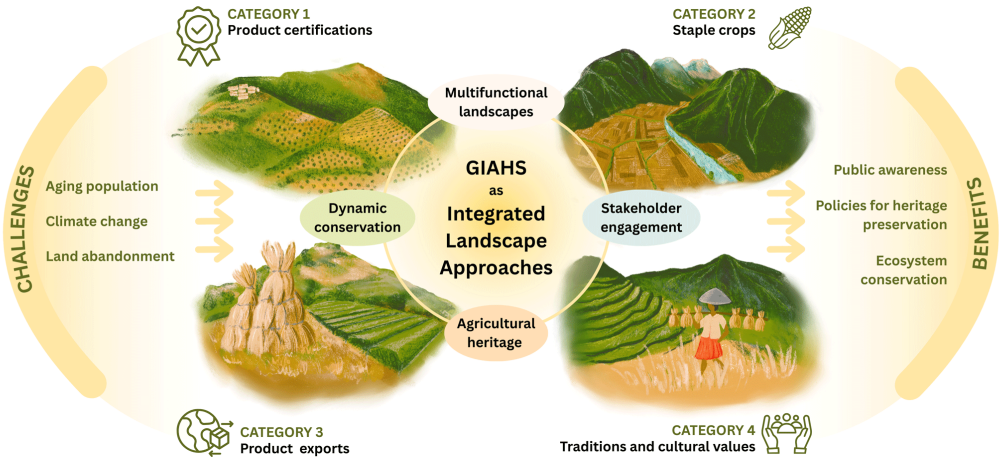
Some of the key features highlighted by the categories of GIAHS found in this study underscore further similarities, as shown in Figure 6. For instance, category 1 and category 4 present some overlaps with the categories of integrated landscape approaches found by Carmenta et al. (2020). The emphasis on category 1, regarding the role of product certification in maintaining high agrobiodiversity and enhancing cooperation among stakeholders, aligns with the category "Certification, institutions and participation" (Carmenta et al. 2020). Although the focus on the environment and its conservation in category 4 may be found in the "Conservation-oriented integrated landscape initiatives." Categories 2 and 3 also share characteristics with integrated landscape approaches such as multifunctional land uses (Estrada-Carmona et al. 2024) and multi-level stakeholder engagement (Milder et al. 2014, García-Martín et al. 2016, Zanzanaini et al. 2017).

GIAHS in the context of landscape-based programs

GIAHS also present similarities and complementarities with other, well established landscape-based programs such as UNESCO World Heritage Sites, LTSER platforms, and Biosphere Reserves. In some cases, the designations also overlap geographically (Kajima et al. 2017, Uchiyama et al. 2017, Sekine 2021). For example, the focus on heritage in agriculture is shared with the Cultural Landscapes category of UNESCO World Heritage Sites, with the difference that although UNESCO's designation focuses on "Outstanding Universal Value" of a landscape and/or a local tradition, GIAHS focus on designating systems that are based on sustainable livelihoods and food security (FAO 2015). GIAHS also include the concept of dynamic conservation, which aims at maintaining these agricultural systems as active and evolving, therefore treating heritage not as an element immutable in time, but rather as a set of ecological processes and socio-cultural practices that constantly change, adapt, and coevolve through time (Koohafkan and Altieri 2011).

The GIAHS idea of strengthening social-ecological systems based on high agrobiodiversity is shared among the LTSER platforms (Haberl et al. 2006). Nonetheless, while LTSER are primarily based on a strong connection with universities and research centers (Angelstam et al. 2019), GIAHS are still developing strategies for monitoring such complex systems (Jiao

Fig. 6. Globally Important Agricultural Heritage Systems (GIAHS) key overlaps with integrated landscape approaches, while bringing a unique focus on agricultural heritage. Figure created by the authors.



et al. 2022). Biosphere Reserves highlight the importance of sustainable development and the conservation of farming systems in rural areas (Stoll-Kleemann and O'Riordan 2017), an element also central to GIAHS, and highlighted by the dynamic conservation principles (FAO 2022).

Given these similarities, the learnings from other designations could benefit the more recently established GIAHS program to address the current challenges. The systematic monitoring of LTSER, which is done together with local institutions (Dick et al. 2018) and helps foster adaptive governance (Bretagnolle et al. 2018), could offer valuable insights for strengthening GIAHS' dynamic approach to agricultural systems. Biosphere Reserves' strategies for sustainable regional development, including value chain development and networking across sites (Dabard et al. 2025), could be fruitfully considered in GIAHS to enhance capacity building, address rural exodus, and increase the resilience of local food systems (Wood et al. 2023). Finally, UNESCO Cultural Landscapes are under the World Heritage Convention, ensuring that all state parties commit to the identification and protection of heritage sites (UNESCO 2025), while GIAHS are a FAO program with lower institutional backing. A further promotion of GIAHS at an institutional level, further integrating it in national and international programs, could help expand its regional reach, supporting GIAHS designations (and conservation) in poorly represented areas of the world, such as Sub-Saharan Africa and Eastern Europe.

Limitations of the study

Our study presents some methodological limitations. First, the choice of language for the survey (English and French) reduced the number of actors who could understand and complete the survey. Second, internet access was necessary to complete the online survey, which might have prevented some actors, i.e., those with limited access to digital devices and internet connection, from participating. Additionally, although the authors carefully identified potential contacts to send the survey to, it is essential to acknowledge that individuals with an available online email address could be rare among the farmers in GIAHS. This is also evident from the type of respondents who actually filled out the survey: most of them were researchers, with a smaller participation from other actor groups.

Third, Q-method is particularly useful to identify issues related to integrated landscape approaches thanks to its ability to reveal different points of view on complex and multifaceted issues (Langston et al. 2024). Nonetheless, with most of our respondents being researchers, some of this diversity may have been dampened. In fact, although researchers provided valuable input on local farming systems that they might not have had the chance to express in their own studies, it was still the perspective of someone often coming from the outside. Perhaps a study with a stronger focus on farmers as respondents might have revealed a different distribution of priorities within the local production systems.

Fourth, although Q-sort surveys can be fruitfully combined with a few key informant interviews to collect qualitative material (Dieteren et al. 2023), we did not conduct interviews but chose to use open-ended questions within the survey. This provided us with some contextualized information from the cases, although with a limited level of detail. Last, although the survey was aimed at all GIAHS worldwide, some sites were not linked to any viable contact information, making it impossible to collect responses from those sites within the time frame of this survey. Consequently, sub-Saharan Africa, the Middle East, and some parts of South Asia are not represented in the sample (Fig. 1).

CONCLUSION

GIAHS offer a unique focus on agricultural heritage conservation that is rarely present in other integrated landscape approaches. Our analysis highlighted that product certification, small-scale farming for personal consumption, international markets, and a strong cultural tie to the landscape are four main strategies that enable GIAHS to keep agricultural production alive and sustain local livelihoods. Further, it showed that designation helped achieve greater visibility of the sites and, in some cases, increased economic viability through tourism and labeling of local

products. The emphasis on heritage conservation, while promoting product qualities and value chains, as well as traditional agricultural practices, may help build a bridge to harmonize conservation and production in farming landscapes. However, the results illustrated that GIAHS are not immune to the challenges characterizing rural areas worldwide, namely land abandonment, the aging population, and increased disturbances related to a changing climate.

This highlights a need for the designation to further strengthen strategies that promote alternative sources of income, to concretize dynamic conservation guidelines to face socio-demographic and ecological changes, and to develop policy recommendations that address the deagrarianization and the commodification of rural areas. Themes related to the creation of GIAHS specific policies and efforts made to increase capacity building remain only broadly addressed both by the results of this study, and by the literature available, underlining the need for further studies to better understand concrete plans, strategies, and their outcomes when setting out to achieve the goals outlined by the GIAHS program.

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Data Availability:

The data that support this study are available on request by the corresponding author, MCC. Such data are not available publicly as they contain information that may compromise the privacy of the participants.

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Appendix 1 – Literature connected with the creation of the Q-survey statements

Landscape products and sustainability features	Statements	Literature sources
Product qualities	1. Local agri-food products hold a quality certificate (e.g. geographic indication, organic production, regional labels).	(Andreotti et al., 2023; Borrello et al., 2021; Fagandini Ruiz et al., 2021; Fukamachi, 2020; Isoda et al., 2022; Jacob et al., 2018; Kajima et al., 2017; Piras et al., 2023; Qiu et al., 2013; Sekine, 2022; Uchiyama et al., 2017; Usio, 2020)
Product qualities	2. Local crop varieties cultivated in my GIAHS are known worldwide for their unique taste.	(Amnaj, 2017; Guo et al., 2021; Singh & Rana, 2018; Vasco et al., 2024; N. Wang et al., 2021)
Farming practices	3. My GIAHS has been cultivated with the same traditional crop(s) for centuries.	(Bahnasy, 2023; Liang et al., 2013; Nahuelhual et al., 2014; Piras et al., 2023)
Farming practices	4. Animals like donkeys and mules are used to carry heavy weights and to plough the fields.	(Guo et al., 2021; Sirimanna et al., 2022)
Farming practices	5. Conventional crops, chemical fertilizers and pesticides are made available by the local government.	(Guo et al., 2021; Weerahewa & Dayananda, 2022; Yang et al., 2019)
Farming practices	6. Traditional land management practices are widely practiced (e.g. swidden agriculture, crop rotation, intercropping and agroforestry).	(Amnaj, 2017; Bai et al., 2020; Camacho et al., 2016; Fukamachi, 2020; Jacob et al., 2018; Kohsaka et al., 2021; Lennox & Gowdy, 2014; Nahuelhual et al., 2014;

Landscape products and sustainability features	Statements	Literature sources
		Pascual-Seva & Pascual, 2021; Sirimanna et al., 2022; N. Wang et al., 2021)
Farming practices	7. Visitors are involved in farm life (e.g. by participating in planting and harversting of crops, renting land for kitchen gardens).	(Amnaj, 2017; Chen et al., 2016; Fukamachi, 2020; Qiu et al., 2013)
Farming practices	8. My GIAHS is characterised by many small, fragmented parcels.	(Borrello et al., 2021; Chen et al., 2016; Pascual-Seva & Pascual, 2021; Uchiyama et al., 2017; Vasco et al., 2024)
Farming practices	9. In my GIAHS, changes in climate lead to substantial shifts in the agricultural production spectrum.	(Choo et al., 2024; Jacob et al., 2018; Miyake & Kohsaka, 2023; Weerahewa & Dayananda, 2022)
Farming practices	10. Farmers rely on cooperation for the management of common resources and the completion of demanding tasks.	(Andreotti et al., 2023; Fukamachi, 2020; Kohsaka et al., 2021; Lennox & Gowdy, 2014; Sirimanna et al., 2022; Spadaro & Vallerani, 2023; Weerahewa & Dayananda, 2022)
Farming practices	11. Local farmers preserve traditional crop varieties through seed banks.	(Guo et al., 2021; Singh & Rana, 2018)
Value chain characteristics	12. Short marketing channels (e.g. farmer's markets) and local food systems are at the base of local sustainability strategies.	(A. N. Kumar et al., 2015; Sarabia et al., 2021; Spadaro & Vallerani, 2023; Uchiyama et al., 2017; N. Wang et al., 2021)

Landscape products and sustainability features	Statements	Literature sources
Value chain characteristics	13. The food produced in my GIAHS is considered a key ingredient/a staple food in the whole country.	(Amnaj, 2017; Kikuchi, 2021; A. N. Kumar et al., 2015; Sirimanna et al., 2022)
Value chain characteristics	14. Processing of the agricultural raw products is carried out in the GIAHS.	(Amnaj, 2017; Andreotti et al., 2023; Jacob et al., 2018; Tang et al., 2023; Vasco et al., 2024; Zhang et al., 2022)
Value chain characteristics	15. A variety of my GIAHS's products is presented to guests at restaurants, shops and guest houses.	(Amnaj, 2017; Inoue & Iihoshi, 2024; Jiang & Zhang, 2023)
Value chain characteristics	16. Some of my GIAHS's products are exported for international markets.	(Fagandini Ruiz et al., 2021; Kajima et al., 2017; Spadaro & Vallerani, 2023; Vasco et al., 2024)
Ecological features	17. Traditional farming practices help ensure the maintenance of high agrobiodiversity.	(Chen et al., 2016; Dewapura & Jayatilleke, 2022; Fuller et al., 2015; Jiang & Zhang, 2023; Santoro, 2022; Uchiyama et al., 2017; Usio, 2020; Vasco et al., 2024)
Ecological features	18. Animal manure is used to fertilize the fields and improve soil health.	(Andreotti et al., 2023; Santoro, 2022)
Ecological features	19. The area is characterized by historical irrigation/water management systems.	(Fukamachi, 2020; Sarabia et al., 2021; Sirimanna et al., 2022; Weerahewa & Dayananda, 2022)

Landscape products and sustainability features	Statements	Literature sources
Cultural features	20. Wild plants are included in traditional food and recipes.	(Chen & Qiu, 2012; Kohsaka et al., 2021; K. Kumar et al., 2023)
Cultural features	21. Essential nutrition is ensured at household level in the form of kitchen gardens.	(Ducusin et al., 2019; A. N. Kumar et al., 2015)
Cultural features	22. The farming practices of my GIAHS are at the center of rituals, festivities and various literary and artistic works.	(Amnaj, 2017; Jiang & Zhang, 2023; Kohsaka et al., 2021; Y. Wang et al., 2022)
Cultural features	23. Farming is paired with crafting activities done with the byproducts of farming (e.g. carpet weaving).	(Manian et al., 2022)
Social features	24. Traditionally, who harvests larger yields will share with who has harvested less.	(Choo et al., 2024)
Social features	25. Expensive machineries are shared within the community.	(Andreotti et al., 2023; N. Wang et al., 2021)
Social features	26. Women are involved in farming activities (e.g. in the transformation of products, selection of seeds).	(Amnaj, 2017; Choo et al., 2024; Fukamachi, 2020; Fuller et al., 2015; Qadri, 2019; Singh & Rana, 2018)
Social features	27. Access to land and land use is strictly regulated by the government.	(Gu et al., 2012)
Social features	28. Farmer's associations facilitate access to markets for local products.	(Amnaj, 2017; Jiang & Zhang, 2023; Spadaro & Vallerani, 2023; Vasco et al., 2024)

Landscape products and sustainability features	Statements	Literature sources
Economic features	29. Rural tourism is promoted as a driver of rural regeneration.	(Chen et al., 2016; Inoue & Iihoshi, 2024; Lee et al., 2022; Piras et al., 2023; Sekine, 2021, 2022)
Economic features	30. Cash crops are cultivated to generate income for farmers.	(Guo et al., 2021; Santoro, 2022)
Economic features	31. Some farms or farming practices are commercialised as touristic attractions.	(Chen et al., 2016; Gu et al., 2012; Y. Wang et al., 2022; Yang et al., 2019)
Economic features	32. Local farmer's associations are able to secure subsidies for farming and land management.	(Amnaj, 2017; Fukamachi, 2020; Lee et al., 2022)
Economic features	33. Diversifying farm products helps locals to maintain income and food security.	(Andreotti et al., 2023; Guo et al., 2021; Inoue & Iihoshi, 2024; Vasco et al., 2024; N. Wang et al., 2021; Yang et al., 2019)
Economic features	34. Locals also participate in the market economy as labour force or in the tourism industry.	(Fuller et al., 2015; Weerahewa & Dayananda, 2022)

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Appendix 2 – Formulation of open questions of the survey

Q1: Why did you choose the 2 statements in 'most relevant'?

Q2: What are the key impacts of the GIAHS designation on your site?

Q3: What are the key challenges of your site's farming systems?

Appendix 3 – The values assigned to each statement in relation to the 4 categories

Values represented by the Z-scores (Z) and normalized Q-scores (Norm) for each statement in relation to the four categories (one corresponding with each factor). The Z-score differences at ($p<0.05$) inform the relevance of each statement (i.e. if a statement forms consensus or is distinguishing) for one or more factors. At the bottom of the table, the eigenvalues and the explained variability for each statement is reported. On the left side of the table, each statement is connected to a different aspect of landscape products and sustainability outcomes. The acronym "CT" stands for category and "F" stands for factor.

Landscape products and sustainability features	**Statements**	**F1- CT1**		**F2-CT2**		**F3-CT3-**		**F4-CT4-**		**Relevance**
		Norm	**Z**	**Norm**	**Z**	**Norm**	**Z**	**Norm**	**Z**	
Product qualities	1. Local agri-food products hold a quality certificate (e.g. geographic indication, organic production, regional labels).	4	1.55	1	0.25	1	0.81	-2	-0.80	F1, F4
Product qualities	2. Local crop varieties cultivated in my GIAHS are known worldwide for their unique taste.	-3	-1.54	3	1.58	4	1.91	0	0.20	F1, F4
Farming practices	3. My GIAHS has been cultivated with the same traditional crop(s) for centuries.	2	0.66	3	1.63	-2	-0.88	1	0.28	F2, F3

Landscape products and sustainability features	Statements	F1- CT1		F2-CT2		F3-CT3-		F4-CT4-		Relevance
		Norm	Z	Norm	Z	Norm	Z	Norm	Z	
Farming practices	4. Animals like donkeys and mules are used to carry heavy weights and to plow the fields.	-4	-2.23	-3	-1.22	-3	-1.18	-4	-1.94	
Farming practices	5. Conventional crops, chemical fertilizers and pesticides are made available by the local government.	-1	-0.38	-2	-0.70	-1	-0.61	-1	-0.34	Consensus
Farming practices	6. Traditional land management practices are widely practiced (e.g. swidden agriculture, crop rotation, intercropping and agroforestry).	3	1.35	1	0.11	-1	-0.52	-2	-0.73	F1, F2
Farming practices	7. Visitors are involved in farm life (e.g. by participating in planting and harvesting of crops, renting land for kitchen gardens).	0	-0.27	0	-0.11	1	0.64	-2	-1.07	F3, F4
Farming practices	8. My GIAHS is characterized by many small, fragmented parcels.	3	1.23	2	1.47	2	0.86	-3	-1.27	F4
Farming practices	9. In my GIAHS, changes in climate lead to substantial shifts in the agricultural production spectrum.	1	0.57	-1	-0.52	0	0.05	3	1.61	F1, F4

Landscape products and sustainability features	Statements	F1- CT1		F2-CT2		F3-CT3-		F4-CT4-		Relevance
		Norm	Z	Norm	Z	Norm	Z	Norm	Z	
Farming practices	10. Farmers rely on cooperation for the management of common resources and the completion of demanding tasks.	-1	-0.35	-1	-0.41	1	0.33	-1	-0.28	
Farming practices	11. Local farmers preserve traditional crop varieties through seed banks.	-3	-1.11	2	0.78	-3	-1.18	-1	-0.54	F2
Value chain characteristics	12. Short marketing channels (e.g. farmer's markets) and local food systems are at the base of local sustainability strategies.	0	0.39	0	-0.12	2	0.87	-1	-0.34	
Value chain characteristics	13. The food produced in my GIAHS is considered a key ingredient/a staple food in the whole country.	-1	-0.56	4	1.89	2	0.86	-1	-0.47	F2, F3
Value chain characteristics	14. Processing of the agricultural raw products is carried out in the GIAHS.	2	0.85	1	0.15	0	0.09	0	0.20	
Value chain characteristics	15. A variety of my GIAHS's products is presented to guests at restaurants, shops and guest houses.	2	0.73	1	0.15	0	-0.33	-3	-1.21	F1, F4

Landscape products and sustainability features	Statements	F1- CT1		F2-CT2		F3-CT3-		F4-CT4-		Relevance
		Norm	Z	Norm	Z	Norm	Z	Norm	Z	
Value chain characteristics	16. Some of my GIAHS's products are exported for international markets.	-1	-0.29	1	0.09	4	2.15	-4	-1.94	F3, F4
Ecological features	17. Traditional farming practices help ensure the maintenance of high agrobiodiversity.	4	1.49	3	1.61	1	0.44	4	1.80	F3
Ecological features	18. Animal manure is used to fertilize the fields and improve soil health.	1	0.65	-1	-0.23	-4	-1.87	1	0.40	F3
Ecological features	19. The area is characterized by historical irrigation/water management systems.	1	0.61	0	0.00	-2	-0.70	0	0.06	
Cultural features	20. Wild plants are included in traditional food and recipes.	-2	-0.99	2	0.68	-2	-0.86	0	0.20	
Cultural features	21. Essential nutrition is ensured at household level in the form of kitchen gardens.	-2	-0.84	-1	-0.43	-1	-0.45	0	-0.20	Consensus

Landscape products and sustainability features	Statements	F1- CT1		F2-CT2		F3-CT3-		F4-CT4-		Relevance
		Norm	Z	Norm	Z	Norm	Z	Norm	Z	
Cultural features	22. The farming practices of my GIAHS are at the center of rituals, festivities and various literary and artistic works.	-1	-0.46	-1	-0.53	-2	-0.97	4	1.74	F4
Cultural features	23. Farming is paired with crafting activities done with the byproducts of farming (e.g. carpet weaving).	-3	-1.09	0	0.08	-3	-1.49	2	0.55	
Social features	24. Traditionally, who harvests larger yields will share with whom who has harvested less.	-4	-1.87	-3	-1.33	0	0.07	2	0.81	F1, F2
Social features	25. Expensive machineries are shared within the community.	-2	-1.02	-4	-1.97	2	0.97	-2	-1.01	F2, F3
Social features	26. Women are involved in farming activities (e.g. in the transformation of products, selection of seeds).	1	0.60	4	1.66	0	0.01	2	1.27	F3
Social features	27. Access to land and land use is strictly regulated by the government.	-2	-1.06	-3	-1.15	-1	-0.49	0	0.14	

Landscape products and sustainability features	Statements	F1- CT1		F2-CT2		F3-CT3-		F4-CT4-		Relevance
		Norm	Z	Norm	Z	Norm	Z	Norm	Z	
Social features	28. Farmers' associations facilitate access to markets for local products.	0	-0.03	0	-0.21	3	1.06	2	0.54	
Economic features	29. Rural tourism is promoted as a driver of rural regeneration.	2	1.06	-2	-1.02	3	1.06	1	0.34	F2
Economic features	30. Cash crops are cultivated to generate income for farmers.	3	1.44	0	0.07	0	-0.07	-3	-1.41	F1, F4
Economic features	31. Some farms or farming practices are commercialized as touristic attractions.	0	-0.06	-2	-0.56	3	0.99	1	0.34	
Economic features	32. Local farmer’s associations are able to secure subsidies for farming and land management.	0	0.25	-4	-1.71	1	0.83	1	0.34	F2
Economic features	33. Diversifying farm products helps locals to maintain income and food security.	1	0.51	2	0.82	-4	-1.77	3	1.47	F3

Landscape products and sustainability features	**Statements**	**F1- CT1**		**F2-CT2**		**F3-CT3-**		**F4-CT4-**		**Relevance**
		Norm	**Z**	**Norm**	**Z**	**Norm**	**Z**	**Norm**	**Z**	
Economic features	34. Locals also participate in the market economy as labor force or in the tourism industry.	0	0.22	-2	-0.80	-1	-0.67	2	1.27	F1, F4
	Explained variance (%)		19.66		11.12		9.24		8.18	
	Eigenvalues		6.09		3.45		2.86		2.54	