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全球重要農業文化遺產（GIAHS）的永續協同效應及其對農村振興的啟示：範疇性回顧與書目計量分析

Sustainability Synergies of Globally Important Agricultural Heritage Systems (GIAHS) and Their Implications for Rural Revitalization: A Scoping Review and Bibliometric Analysis

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摘 要

全球各國正在面臨顯著的農村空洞化，此現象主要是由於農村人口向城市遷移、都市化、農業工業化、商業農業擴展以及人口老化等因素驅動。全球重要農業文化遺產（GIAHS）計劃旨在認可並保護那些透過人類與自然互動形成的獨特傳統農業系統和景觀，並將這些系統視為「活的」遺產。本文系統地評估了相關學術文獻，探討 GIAHS 是否能成為農村振興的驅動力，並評估該計劃的永續性影響。我們利用 SCOPUS 數據庫識別了 121 篇與 GIAHS 相關的文章，進行了文獻計量分析。我們針對 32 項有記錄 GIAHS 影響的研究進行主題分析。總體而言，GIAHS 的永續性影響結果不一，只有兩項研究明確將 GIAHS 與農村振興連結。我們主張應採用更系統化的評估方法和指標，將 GIAHS 與農村振興策略和過程相結合，並提升灰色文獻與學術研究之間的知識協同效應。總之，儘管 GIAHS 在成為農村振興驅動力方面具有潛力，但在這一新興主題上的學術文獻仍然存在知識缺口。

關鍵詞：全球重要農業文化遺產（GIAHS）、農業遺產、永續性影響、農村振興、文獻計量分析

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Abstract

Countries worldwide are witnessing the process of massive rural hollowing, which is being caused by increased rural-to-urban outflow, urbanization, agricultural industrialization, expansion of commercial agriculture, and population aging. The Globally Important Agricultural Heritage Systems (GIAHS) programme recognizes and aims to conserve unique traditional agricultural systems and landscapes that have been created through human-nature interactions. GIAHS considers these agricultural systems as 'living' heritage systems. The goal of this article is to systematically assess the academic literature, by employing bibliometric and thematic analysis methods, on whether GIAHS can be a driver of rural revitalization and we assess the sustainability impacts of the programme. Using the SCOPUS database, we identified a total of 121 GIAHS-related articles for the general bibliometric analysis. Next, for the thematic analysis, 32 studies which document impacts of GIAHS were identified. At best, the sustainability impacts of GIAHS were mixed, and we only found two studies which explicitly linked GIAHS to rural revitalization. In this article, we argue for more systematic assessment methods and indicators that link GIAHS to rural revitalization strategies and processes, and a better synergy between knowledge presented in the grey literature and academic research. Conclusively, GIAHS has a strong potential to be a driver of rural revitalization, but knowledge gaps in the academic literature on this emerging theme still persist.

Keywords: Globally Important Agricultural Heritage Systems (GIAHS), Agricultural heritage, Sustainability impacts, Rural revitalization, Bibliometric analysis

INTRODUCTION

It is a universal trend that population outflow from rural to urban areas takes place (which some describe as "a rural exodus") and global birth rates decline, especially in developed countries (Liu and Li, 2017). The World Cities Report 2022 states that we are witnessing "a world that will continue to urbanize over the next three decades—from 56 per cent in 2021 to 68 per cent in 2050" (UN-Habitat, 2022: xv). Globally, many peripheral and rural regions face stagnating and declining populations in tandem with struggling economies and outmigration flows (van der Star and Hochstenbach, 2022). As a result, rural communities are likely to be less active due to depopulation and population aging. This process of rural hollowing can cause a series of problems, such as farmland loss, loss in traditional agricultural systems, and deterioration of the rural residential environment and community structure (Li *et al*., 2014; Liu and Li, 2017; Yang *et al*., 2021). For instance, in Japan, a country with a super-aging population, 1.7 million hectares of farmland has already been lost between 1961 and 2019. This being caused by urbanization, aging and a shortage of successors and new entrants in agriculture (Kimura, 2021). Further driven by agricultural industrialization and capitalist expansion of commercial agriculture, the loss in traditional agricultural systems has led to a global, increasingly rapid, loss of agrobiodiversity and crop diversity (Bélanger and Pilling, 2019; Kimura, 2021).

The Globally Important Agricultural Heritage System (GIAHS) program is a global initiative which

aims to conserve global agricultural heritage and counteract the loss of agrobiodiversity. The GIAHS program is a designation scheme implemented by the Food and Agriculture Organization of the United Nations (FAO) since 2002, and, as of August 2024, 86 GIAHS sites from 26 countries have been officially designated by the FAO (Food and Agriculture Organization - FAO, 2024). The overall goal of the GIAHS program is to recognize and conserve unique agricultural systems and landscapes that have been created through human-nature interactions. Such systems are distinct from mass and intensive production of particular food species or monocrops. These unique systems have been developed from the long-standing local knowledge systems of people living within or in close proximity to local unique ecosystems to sustain their food security and livelihoods. The five key selection criteria to become a designated GIAHS site are divided into the following dimensions: (1) food and livelihood security; (2) agrobiodiversity; (3) local and traditional knowledge systems and technologies; (4) cultures, values, and social organizations; and (5) landscapes and seascapes features. The objectives of the GIAHS program include to establish global and national recognition of the importance of agricultural heritage systems, build the capacity of local farming communities as well as local and national institutions, and to promote enabling regulatory policies and incentive environments to support GIAHS (FAO 2024). GIAHS values the social traditions, cultural heritage, and landscapes that are preserved through the daily practices of agriculture, forestry, and fisheries. GIAHS sites are thus regarded as 'living' heritages, where revitalization of the community is expected, and agricultural systems and landscapes developed by the very same community are sustained and preserved (He *et al*., 2020).

A significant challenge facing GIAHS is the issue of population aging, particularly in East Asian countries like Japan. As the population ages, there is a growing risk that traditional agricultural heritage and practices may decline and be lost (Nath *et al*., 2024). Tansuchat and Plaiphum (2023) highlight that rural youth out-migration, combined with an aging farming population and lack of successors, threatens both sustainable agriculture and food security of many rural communities worldwide. The designation as a GIAHS site can contribute to rural revitalization, through increased (rural) tourism, sales and branding of local agricultural products, and increased awareness and pride of local residents (Chen and Qiu, 2013; He and Min, 2013; Miyake *et al*., 2021; Vafadari, 2013). The continuation of unique agricultural practices based on agricultural biodiversity can sustain local environments, and thus active farmers or vital community engagement are a prerequisite of working GIAHS sites (Hara *et al*., 2021). Agnoletti and colleagues (2023) state *"GIAHS programme may contribute to the development of economic activities for the conservation and promotion of landscape resources, infrastructures, services, and marketing of landscape resources, diversifying the rural economy*" (Agnoletti *et al*., 2023, p. 5). Therefore, positive impacts on social, environmental, and economic aspects of rural revitalization are expected under the GIAHS program (Jiao *et al*., 2022). Although it has been two decades since the inception of the GIAHS program, the above-mentioned three impacts of GIAHS have yet to be comprehensively evaluated.

This article, combining a scoping review with bibliometric and thematic analyses, examines academic

studies on the GIAHS program, focusing on its social, environmental, and economic sustainability impacts over the past two decades to assess whether GIAHS can act as a driver of rural revitalization. Here rural revitalization is defined as a systematic and comprehensive strategy to strengthen rural economies and societies, which involves various government and private sector initiatives, but it ultimately revolves around rural residents who are in charge of revitalizing their community, environment and economy as an ongoing process against rural hollowing, depopulation, and socio-economic stagnation (Gladwin *et al*., 1989; Liu *et al*., 2023; Yang *et al*., 2021; Yin *et al*., 2022). We focus exclusively on academic articles because they are peer-reviewed, ensuring validation by external experts. In contrast, grey literature—such as government reports—may be prone to overestimating the impacts of GIAHS due to performance-oriented perspectives. Many studies have already been conducted on GIAHS, which includes several review and meta-level studies (Nagata and Yiu, 2021; Jiao *et al*., 2022; Kajihara *et al*., 2018). However, till date no study has addressed the question of whether GIAHS can mitigate the process of rural hollowing among global agricultural heritage sites and stimulate global agrobiodiversity conservation. Through employing a bibliometric and thematic analysis, this study aims to answer this question through evidence gap mapping and puts forwards recommendations on future research and policy directions.

This article is organized as follows: Section 2 covers the materials and methods. Section 3 discusses the results, with a dedicated subsection exploring how Taiwan can gain insights from global and Japanese experiences with GIAHS. Finally, Section 4 concludes with potential future directions and a reflection on the study's limitations.

MATERIAL AND METHODS

In the SCOPUS database, we used the keywords "GIAHS" or "Globally Important Agricultural Heritage Systems" for the first search in the titles, abstracts or keywords of articles. In the second search, we included the names of all GIAHS heritage sites in combination with "Agricultural Heritage" as keywords. The timeframe of the analysis was from 2006 until 2021. We included studies in all languages, including English, Chinese, Japanese, Spanish and French. The methodology and data analysis of our study was similar to other bibliometric analyses (Bayrak *et al*., 2021; Maretti *et al*., 2019), but its primary purpose was to document the impacts of GIAHS on local communities, landscapes and economies as a means to achieve rural revitalization (see Figure 1).

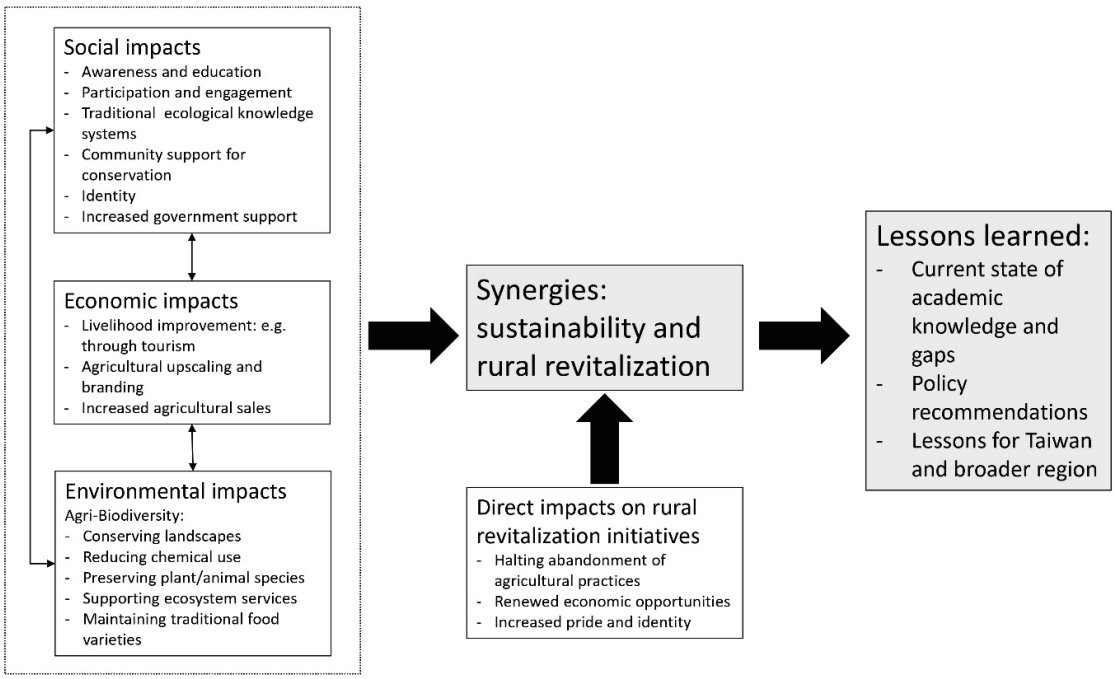

Figure 1: Thematic framework (derived from: García *et al*., 2020; Bai *et al*., 2024; Nath *et al*., 2024)

In total, both searches yielded 128 articles (after removing duplicates), of which 119 were original articles, 6 were review papers, and 3 were conference papers. Seven articles were removed as they were not related to GIAHS at all. The remaining 121 GIAHS-related articles were used for the general bibliometric analysis. The general analysis aimed to map existing studies on GIAHS and establish their broader context. Additionally, this analysis offers valuable insights into the geographical characteristics of the GIAHS studies and the journal sources from which they originate.

Subsequently, for the thematic analysis, we analyzed whether the studies documented impacts of GIAHS from original research. Figure 1 presents the thematic framework of the study, incorporating indicators derived from prior GIAHS impact studies. These indicators are operationalized into sub-indicators that capture social, economic, and environmental impacts, aligning with the GIAHS objectives (García *et al*., 2020; Bai *et al*., 2024; Nath *et al*., 2024). The lessons learned are relevant for identifying knowledge gaps in the academic literature, informing policymakers, and reflecting on the lessons learned for Taiwan and the broader region. We systematically reviewed all 121 studies to identify relevant impacts and their corresponding indicators. After careful screening, we excluded studies that did not specifically focus on GIAHS impacts (n=70), did not report any impacts (n=16), were inaccessible due to the absence of full texts online (n=2), or addressed other types of impacts (n=1). Ultimately, 32 studies were selected for inclusion in the thematic analysis. Given the relatively small number of studies, we conducted a comprehensive thematic analysis.

For the thematic analysis, we documented whether studies presented findings on social (including knowledge preservation, social cohesion, and other types of social impacts); environmental (including conservation of natural and man-made landscapes); and/or economic (including agricultural exports and tourism activities) impacts. If studies documented both social and economic impacts, we categorized it as socioeconomic impacts (and the same counted for socioenvironmental or economic-environmental), and if all three dimensions were mentioned it was categorized as sustainability impact. Additionally, we analyzed whether the studies included a discussion on impacts of population aging as well as whether rural revitalization was explicitly discussed or not. This thematic analysis contributes to evidence gap mapping (cf. Snilstveit *et al*., 2013) to assess the effects of GIAHS on sustainability and, in particular, on rural revitalization.

RESULTS AND DISCUSSION

1. Descriptive statistics

Figures 2 and 3 show the number of studies indexed in SCOPUS on GIAHS and source titles respectively. The year 2020 hit the peak with 34 studies published, and the journal Sustainability (Switzerland) published most GIAHS-related papers. Original case study papers were the largest category among the published papers (69.4%), multiple case studies research came second (13.2%), and global/meta-level studies and theoretical papers both shared the third place making up 8.3% of the published papers each. In terms of geographical focus, China was the most studied country (52.1%), followed by Japan (16.5%), multiple countries (6.8%), South Korea (2.5%) and Spain (2.5%). This finding is not surprising considering that both China and Japan are forerunners on GIAHS. In terms of specific GIAHS sites, Hani Rice Terraces in China (13.2%), Rice Fish Culture in China (12.4%), and Noto's Satoyama and Satoumi in Japan (6.6%) received the most attention among the published studies. Around 5.0 % and 5.8% of the studies focused on multiple GIAHS sites either within the same country or across countries respectively. The findings of the general analysis show that there is a plethora of original case studies which could provide further insights into the impacts of GIAHS.

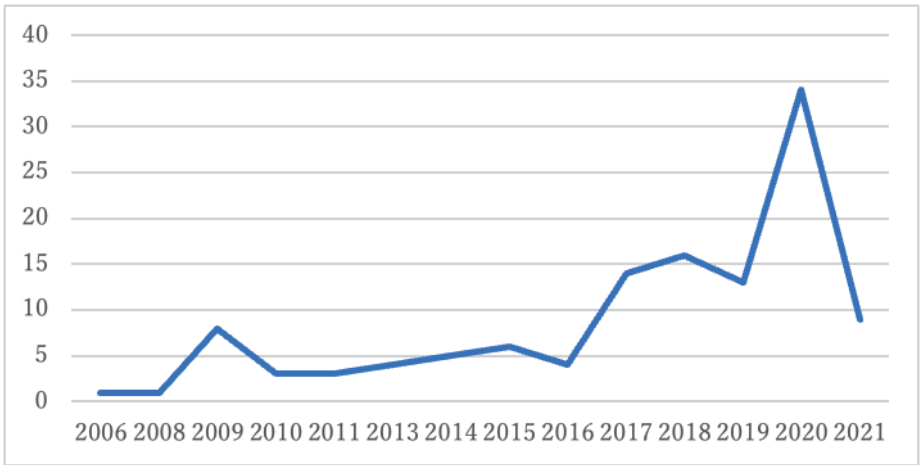

Figure 2 Number of studies (absolute value - abs)

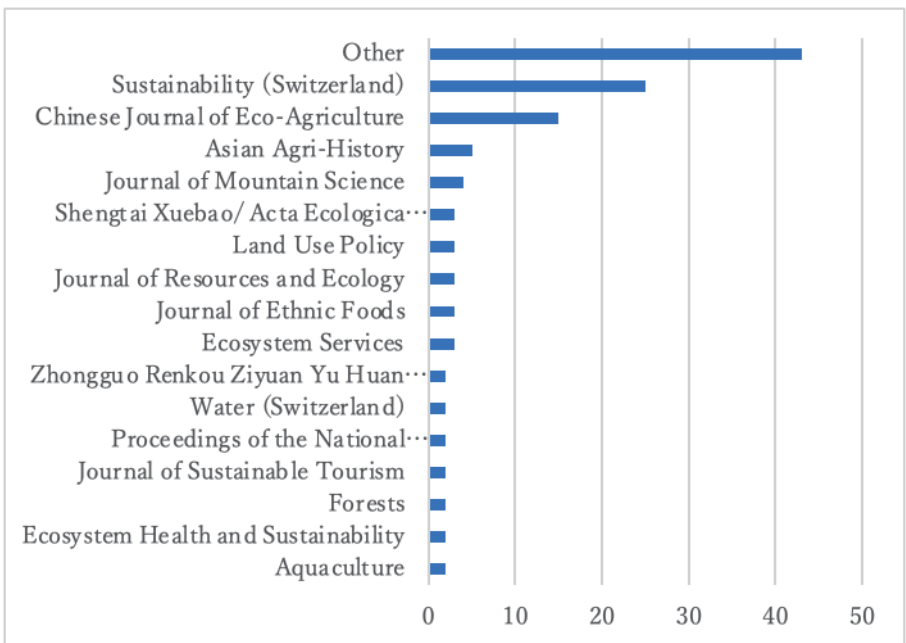

Figure 3 Source titles (abs)

2. Impacts of GIAHS: an overview

Of the 32 studies that were selected for the thematic analysis, 28.1% focused on the economic impact of GIAHS on the local communities (Table 1). Studies that explicitly adopted a sustainability approach comprised of 12.5% of all the studies, which included social, economic and environmental dimensions. Respectively, 15.6% and 6.3% of the studies explicitly discussed the themes of aging and rural revitalization. Most of the studies were case studies (75.0%), focusing on the impacts of GIAHS on one research site. In terms of time frame of the research, 43.8% of the studies stated this to be between 1 to 2 years. Remarkably,

34.4% of the studies were unclear about their time frame. For impact studies this is problematic, as it is difficult to establish an ex-ante and ex-post situation. Further, China was also the most studied country among the 32 selected studies (62.5%), followed by Japan (28.1%) and other (Asian) countries. In terms of research methods, most studies adopted mixed methods, including, and not limited to, qualitative (90.6%) and quantitative (90.6%) methods, secondary data/policy analysis (25.0%), ecological survey (21.9%), and GIS/Remote sensing (12.5%).

Table 1 Quantitative analysis of impact studies

Documented impact	**Abs**	**%**
Social impact	3	9.4
Environmental impact	6	18.8
Economic impact	9	28.1
Socio-environmental impact	2	6.3
Socio-economic impact	8	25.0
Sustainability (all three dimensions) impact	4	12.5
Documented discussion		
Aging was explicitly linked to GIAHS	5	15.6
Rural revitalization was explicitly linked to GIAHS	2	6.3
Type of study		
Original research: case study	24	75.0
Original research: comparative study	5	15.6
Global or meta-study	2	6.3
Other	1	3.1
Time frame		
1-2 years	14	43.8
3-5 years	3	9.4
6-10 years	1	3.1
>10 years	3	9.4
No time frame mentioned	11	34.4
Study country		
China	20	62.5
Japan	9	28.1
The Philippines	1	3.1
Republic of Korea	1	3.1
Multiple countries/global	1	3.1
Total	***32***	***100***

3. Social impacts

The documented social impacts of GIAHS were mixed. The social impacts were divided into awareness of residents of GIAHS, agricultural heritage and conservation; community and citizen participation; knowledge sharing and education; community-led conservation of traditional agricultural systems; and sense of pride and identity. Some studies found that GIAHS increased residents' awareness of conservation initiatives (Su *et al*., 2018) as well as increased cognition and positive attitudes towards GIAHS sites (Ren *et al*., 2015). Additionally, increased awareness of the necessity to preserve and pass on traditional agricultural systems to the younger generations due to GIAHS was also observed (Qiu *et al*., 2014). Active farmers of the Minabe-Tanabe Ume system in Japan, who participated in GIAHS, even formed human resource networks which influenced land-use decision making processes in their locality (Hara *et al*., 2018).

On the contrary, other studies found that GIAHS did not lead to increased citizen participation (Kohsaka *et al*., 2019); deeper understanding of agricultural heritage (Sun *et al*., 2019); or an increased rural workforce (Jiao *et al*., 2022). While (local) government support, including financial support, increased for a number of GIAHS sites (Su *et al*., 2018; Su and Sun, *et al*., 2020), it did not always motivate community members to participate in GIAHS (Su and Dong, *et al*., 2020). In some cases, adverse social impacts were also found. For instance, while GIAHS led to a local and international appreciation and recognition of Indigenous knowledge systems of the farmers in the Ifugao rice terraces of the Philippines (in addition to other implemented programmes), it also changed the lifestyles of the younger generations. These newly adopted 'modern' lifestyles strongly influenced Indigenous youth to migrate to urban areas and engage in the market economy (Sekine, 2021). Therefore, some studies strongly questioned, in the context of rural hollowing and outmigration, whether GIAHS could really reverse current population trends (Jiao *et al*., 2022; Yuan *et al*., 2014).

4. Environmental impacts

The environmental impacts of GIAHS were divided into five categories: conservation of the landscape; reduced chemical inputs; preservation of plant and animal species; ecosystem services; and preservation of traditional food varieties. Also in this domain, the documented impacts were mixed, though there were relatively more positive findings than negative ones. In terms of positive impacts, GIAHS led to the preservation of local rice varieties and carp populations (Ren *et al*., 2018); reduced use of chemical inputs and fertilizers (Qiu *et al*., 2014; Xie *et al*., 2011); and landscape and biodiversity conservation (Park and Oh, 2017). Studies documenting no environmental impacts from GIAHS promulgated that GIAHS did not prevent local species loss (Ma *et al*., 2020) or deforestation (Wei *et al*., 2020). Adverse environmental impacts were also observed in one study: in the Philippines GIAHS imposed an excessive ecological burden on the Indigenous communities (Sekine, 2021). As only 18.8% of the studies solely focused on environmental impacts, there is currently not enough scientific evidence on whether GIAHS has had an overall positive impact on the environment and halt agrobiodiversity loss.

5. Economic impacts

Many studies linked GIAHS directly to tourism development initiatives (Kajihara *et al*., 2018; Su and Sun, *et al*., 2020; Sun *et al*., 2019). Economic impacts of GIAHS were often expected to be derived from tourism: rural tourism brought significant economic benefits to aging farmers in Japan as a result of GIAHS (Chen *et al*., 2018); and Noto Peninsula, Japan saw a significant increase in visitors following the location's designation as a GIAHS site (Chen *et al*., 2016). However, not all studies, noted positive impacts from tourism. Xuanhua Grape Garden Urban Agricultural Heritage Site, a GIAHS site in China, did not experience increased tourism development following its GIAHS designation (Su *et al*., 2018); and tourism development sometimes increased economic inequalities among residents as not all localities within a GIAHS site had the same tourism potential (Sekine, 2021; Su and Dong, *et al*., 2020).

Besides tourism, the economic potential of GIAHS was reflected in the branding and/or certification of unique agricultural products from the GIAHS sites (Kohsaka *et al*., 2019; Miyake *et al*., 2021). While Kosaka and colleagues (2019: 125) state that *"branding or promotion products per se is not the primary goal"* of the GIAHS programme, it could be used as a means to revitalize the rural economy (Liu *et al*., 2018). However, the impacts of branding and certification of agricultural products as a result of GIAHS have been more often negative than positive. Industrial farming became the main driver of vegetable sales in a Japanese GIAHS site, due to aging of the community and unstable supply of traditional crops (Miyake *et al*., 2021). Industrial farms could take advantage, through marketing and advertisements, of being located in or near proximity of a GIAHS site, without embodying the principles of agricultural heritage systems. While the sale of traditional Kaga vegetables in a Japanese GIAHS site increased, there was no conclusive evidence, according to Uchiyama and colleagues (2017), that this was a result of GIAHS or whether other factors played a more important role. FAO (Fernandez *et al*., 2020: 5), furthermore states that "*the joint FAO–GIAHS logo cannot be used as labelling for commercial purposes".* Thus, farmers are prohibited to use the GIAHS logo for the branding or promoting of their products due to the public nature of the programme. This is contrary to Agnoletti and colleagues' (2023) assertion that GIAHS could be used for marketing purposes. It is for this reason that we conclude that the economic potential of GIAHS in terms of product branding remains rather low.

Some adverse economic impacts were also observed. In one GIAHS site in China, the government prohibited farmers to sell their land because of GIAHS (Su and Sun, *et al*., 2020), and GIAHS did not prevent, and even exacerbated, the economic exodus of Indigenous communities from their communities and lands in the Philippines (Sekine, 2021).

6. Implications for rural revitalization

Only two studies explicitly linked GIAHS to rural or community revitalization (Chen *et al*., 2018; Miyake *et al*., 2021). This finding is remarkable, as aging population, land abandonment, outmigration, industrial agriculture, and depopulation have been acknowledged by a large number of studies to be a major

threat to GIAHS implementation and/or agricultural heritage conservation (Chen *et al*., 2018; Hara *et al*., 2021; Jiao *et al*., 2016; Miyake *et al*., 2021; Park and Oh, 2017; Sekine, 2021; Su and Sun, *et al*., 2020). This is a major knowledge gap that future studies need to address. In this study, we touched upon the three dimensions that could contribute to rural revitalization, but there is still limited evidence that GIAHS could prevent or halt rural hollowing and depopulation. To illustrate this, one study stated *"Ume orchards are being abandoned as the population ages"* (Hara *et al*., 2018: 12). Additionally, studies need to employ more systematic methods to measure the impact of GIAHS on rural revitalization. While some impact studies have been conducted (Nagata and Yiu, 2021; Jiao *et al*., 2022) and there is a plethora of empirical data on GIAHS sites, there is little evidence in the academic literature that GIAHS contributes positively to rural revitalization.

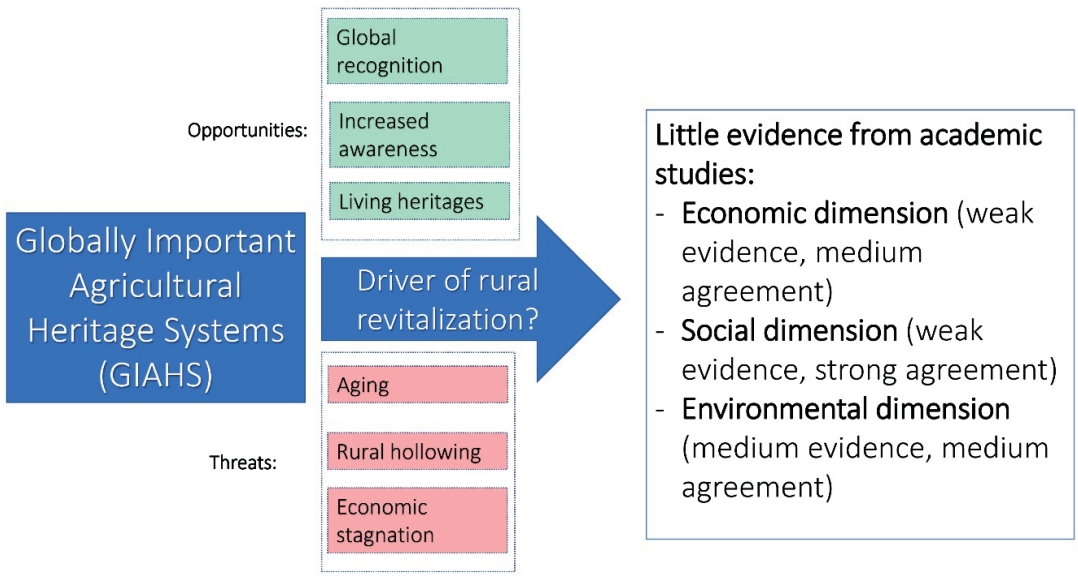

Figure 4: GIAHS as a driver of rural revitalization: opportunities, challenges and evidence

Figure 4 illustrates the opportunities and threats of GIAHS as a driver of rural revitalization, highlighting the synergies between sustainability and revitalization based on evidence from relevant academic studies. The key finding from the bibliometric and thematic analysis is that, based on the academic literature, there is weak-to-medium evidence to support the claim that GIAHS effectively acts as a driver of rural revitalization. This gap is a concern for both GIAHS policymakers and researchers focusing on the impacts of official designations like GIAHS on sustainability, revitalization, and agri-biodiversity and agricultural heritage conservation.

7. Lessons for Taiwan by learning from Japan and other global case studies.

While the scope of this study is global, we briefly reflect in this section on lessons for Taiwan by learning from Japan and other case studies. As Taiwan is not a member of the FAO, we cannot expect any

GIAHS certifications to be issued in Taiwan. Nonetheless, there is a growing number of studies focusing on agricultural heritage, GIAHS, and rural revitalization in the Taiwanese context (such as Chang, 2015, 2016). Similar initiatives exist at the national level, such as the Taiwan Cultural Landscape scheme, the Rural Rejuvenation Plan, and other relevant certification schemes.

Taiwan's Chishang Township, for instance, is often heralded as a successful example in which organic agriculture, traditional agricultural heritage, and local livelihoods play an important role in rural revitalization. In this respect, Taiwan shares many similarities with Japan. Traditional agricultural systems in Japan are based on Satoyama: traditional landscapes often including paddy fields, broadleaved forests, and grasslands, developed through human-nature interaction. These anthropogenic landscapes have rich biodiversity. In Taiwan, equally valuable and unique agricultural systems exist, ranging from Indigenous agriculture (Ba *et al*., 2018) to sustainable organic farming systems (Petway *et al*., 2019). These unique systems need to be preserved as intangible heritage.

In 2015, multiple national stakeholders in Taiwan joined the International Partnership for the Satoyama Initiative (IPSI) through the establishment of the Taiwan Partnership for the Satoyama Initiative (TPSI). The TPSI framework is dedicated to advancing the goals of the Satoyama Initiative, a global movement that promotes socio-ecological production landscapes and seascapes (SEPLS) as strategic approaches to combating biodiversity loss, addressing climate change, and fostering sustainable development (Lin *et al*., 2019). The IPSI website highlights a range of case studies from Taiwan, demonstrating diverse approaches to sustainable agriculture and resource management. These include the traditional Gaya concept of the Indigenous Seediq people in Ren'Ai Township and initiatives focused on sustainable resource management and protected area stewardship within Yilan's Shuanglianpi community (International Partnership for the Satoyama Initiative, 2022). These case studies not only reveal opportunities but also address challenges similar to those faced by GIAHS in preserving agricultural heritage. As such, IPSI, TPSI, and GIAHS share intersecting objectives, creating opportunities for collaboration and synergy among these programs. Exploring these connections further could be a valuable focus for future research.

However, in both countries, certification alone is not enough to rejuvenate rural areas. While it is beyond the scope of this paper to provide detailed recommendations, one key suggestion, based on global GIAHS cases, is to explicitly connect certification schemes with rural revitalization efforts. To preserve living agricultural heritage systems, it is essential to engage local communities, leverage the knowledge of older residents, and use certification schemes to enhance the branding of regional products.

CONCLUSION, LIMITATIONS AND WAYS FORWARD

In this article we analyzed the impacts of GIAHS on societies, economies and environments from a rural revitalization perspective. At best, the sustainability impacts of GIAHS were mixed, and we found little conclusive evidence on the prospects of GIAHS to be a major driver of rural revitalization. This is partly due

to the quality and quantity of existing studies on GIAHS, and partly due to the difficulty of studying the impact of a programme on the respective research sites, among a whole variety of other influencing factors. GIAHS rightly perceives unique agricultural and ecosystems as 'living heritages', which need to be conserved and passed on to the next generations. In that aspect, researchers need to develop new ways of studying the impacts of GIAHS more systematically, whereas policymakers and other stakeholders, including the FAO, need to link GIAHS more comprehensively to rural revitalization strategies (cf. Jiao *et al*. 2022). This article could serve as an important point of reference in this regard. Lessons for Taiwan and the broader region emphasize the importance of integrating diverse certification schemes with traditional ecological knowledge systems, such as Japan's Satoyama, as a cohesive strategy to promote rural revitalization and achieve broader sustainability outcomes.

A major limitation of this study is that we did not incorporate grey literature, government or FAO reports, or other data sources focusing on GIAHS. Therefore, we limit the conclusions of this study solely within the domain of the academic literature. Future studies could analyze other types of documents, whereas policymakers and development practitioners could transform and translate their reports and data into peer-reviewed academic publications. Considering that this is a new area of research, and that GIAHS itself is a relatively new program, this article will hopefully lead to the development of new methodologies and indicators that can measure the effects of GIAHS on rural revitalization more comprehensively. Additionally, academic research should draw more upon the knowledge produced in the grey literature to systematically and holistically assess the impacts of GIAHS, both globally and within GIAHS countries.

As calls for action to revitalize the world's countryside grow (Liu and Li, 2017), we believe that GIAHS holds significant potential in addressing this critical need, although knowledge gaps remain.

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