Review

Study Progress of Important Agricultural Heritage Systems (IAHS): A Literature Analysis

Huiqi Song 1, Pengwei Chen 1, Yongxun Zhang 2,* and Youcheng Chen 1,*

1 Anxi Campus—Anxi College of Tea Science, Fujian Agriculture and Forestry University, Quanzhou 362406, China; songhuiqi2020@163.com (H.S.); chenpengweixuexi@163.com (P.C.)
2 Institute of Agricultural Economics and Development, Chinese Academy of Agricultural Sciences, Beijing 100081, China
* Correspondence: zhangyongxun@caas.cn (Y.Z.); uceng@fafu.edu.cn (Y.C.)

Abstract: Important Agricultural Heritage Systems (IAHS), as a new type of heritage, has received extensive attention from the international scientific communities. With the increase of IAHS research, reviews on it have been conducted by many scholars. However, visualized research to show future research trends of IAHS are lacking. Therefore, using metrology analysis methods, this study aims at presenting the progress of research and the general development trends of Globally Important Agricultural Heritage Systems (GIAHS) in the world from 2006 to 2020 to provide ideas for the development of countries or regions in the future. This study mapped 292 literatures from Web of Science core collections from 2006 to 2020 by CiteSpace software. The results show that research on IAHS from 2006 to 2020 experienced two stages: the fluctuating increase stage, and the steady growth stage. Author groups from China, Italy, the USA, Japan, etc., contributed many papers on IAHS. Institutions including the Chinese Academy of Sciences, the University of Florence and the University of Padua in Italy, etc., have a relatively high influence on international IAHS research. Agriculture Ecosystems & Environment is the most cited journal. Agricultural Heritage Systems, regeneration, agriculture, agroforestry, dry-stone wall, social capital, instability, and agricultural biodiversity have been hotspots in the past 15 years. The research themes mainly focus on GIAHS, tourism, livelihood assets, and direct georeferencing. Authors in different regions concern different research themes. In the future, the fields of applications and microscopic views, social sciences, applications of standardized quantitative research methods, and broadened international cooperation should be paid more attention.

Keywords: Important Agricultural Heritage Systems (IAHS); CiteSpace; visual map; Globally Important Agricultural Heritage Systems (GIAHS)

1. Introduction

To deal with global environmental changes caused by modern agriculture with monocropping and a lot of chemical input, the Food and Agriculture Organization of the United Nations (FAO) initiated the Globally Important Agricultural Heritage Systems (GIAHS) Protection Project in 2002. The GIAHS was defined as a unique land use system and agricultural landscape formed under the long-term coevolution and dynamic adaptation of rural areas and their environments. The system and landscape are rich in biodiversity and could meet the needs of local socio-economic and cultural development. It is conducive to promoting regional sustainable development and is of great value to improve the rural ecological environment [1]. To become a GIAHS, a traditional agricultural system needs to meet five criteria, including having food and livelihood security; biodiversity and ecosystem function; knowledge systems and adapted technologies; culture, value systems and social organizations (Agriculture); and remarkable landscapes and land and water resources management features from FAO [2]. By the end of December 2020, there were 62 GIAHS distributed in 22 countries covering 5 continents. In addition, 15 project
proposals from 9 different countries have been submitted to FAO and are being reviewed by experts [3]. In the East Asian region, Nationally Important Agricultural Heritage Systems (NIAHS) had been launched by China, Korea, and Japan since 2012 [4]. In Europe, the Ministry for Agriculture, Food and Forestry Policies of Italy has also established a national project, called the National Register of Historical Rural Landscapes [5]. These Important Agricultural Heritage Systems (IAHS), including GIAHS and NIAHS, enjoy the characteristics of living, dynamic adaptive, compound, and sustainable [6]. With the promotion and implementation of the IAHS project in the world, IAHS research has been paid more and more attention by scholars all over the world and is becoming a new field. When the first group of GIAHS was designated by the FAO, the literature on IAHS appeared and has increased continually since 2006. The year 2006 marked the beginning of the research field of IAHS [7]. Therefore, reviewing relevant research on IAHS published in the past 15 years will help us grasp international and national GIAHS development trends.

Due to the different starting times of GIAHS in different countries, there are great differences in the depth, breadth, focus, and disciplines of IAHS research in different countries. In recent years, in order to summarize the available research achievements and prospective key research fields, scholars have made some reviews of the relevant literature. For example, Kohsaka et al. used text-mining to analyze the interviews of officers to reveal the practical issues of citizen participation in GIAHS conservation [8] and the official records of issues of GIAHS certification in Japan [9]. Furthermore, Kajima et al. also used text-mining to analyze other problems, for instance, the formal meeting minutes of the city council, to study issues related to the certification of GIAHS between residents and tourists [10] or the certification of landscapes and products [11]. Moreover, Nagata also summarized the GIAHS development situation in Japan in the past decade and provided ideas for the sustainable development of GIAHS in Japan in the future [12]. Zhang et al. used the method of literature statistics to evaluate the papers on IAHS research in China from 2005 to 2015 and identified research hot spots and prospected research priorities in the future in this field [13].

Reviews of IAHS have been conducted for a region or a country, but there have been few international reviews of IAHS research using visual methods. What is more, with the increase of related research results, scholars cannot form a more comprehensive understanding of this field in international GIAHS development. What is the latest global visual situation of IAHS related research worldwide as the amount of research grows? How can the current development trends around the world be shown more clearly? What direction can it provide for the future? CiteSpace, as a visualization tool, may well address these issues. Therefore, based on the core collection of the Web of Science database, this study uses CiteSpace 5.5.R2 software to visually analyze the literature related to the IAHS theme from 2006 to 2020 and illustrates the current situation of international IAHS research. Based on these analyses, this paper puts forward future research prospects and provides references for the theoretical system construction of IAHS.

2. Data and Methods

2.1. Data Sources

Based on the core collection of the WOS database, we took “agricultural heritage system” or “GIAHS” or “IAHS” or “important agricultural heritage system” as the subject words to search for in the literature. Since 2006, scholars have gradually published papers on the background and concept of GIAHS [14], marking the beginning of the research field of IAHS. Therefore, the publication time of the literature was set up from 1 January 2006 to 20 November 2020. The literature type included English articles and reviews. After eliminating the repetitive articles and the articles inconsistent with the theme, 292 papers were obtained. The search results covered the literature related to IAHS in the past 15 years.
2.2. Analysis Method

The knowledge map analysis method can not only reveal the knowledge structure of a research field but also express the evolution process of a related field by maps [15]. The bibliometric method is based on quantitative research methods such as mathematical statistics and uses the Price Law to determine the author distribution and the Brads Law to determine the subject distribution for reflecting the research situation and process in a certain field [16]. CiteSpace software, developed by Dr. Chen, C.M. of Drexel University, is a citation network visualization tool [17].

This paper used CiteSpace 5.5.R2 software to make a visual analysis of the IAHS research by integrating the knowledge map analysis and bibliometric method, eventually building the knowledge map of this field. It helped us to explore the current research situation and hotspots of GIAHS. Research hotspots can be revealed through keyword co-occurrence and social network analysis [18]. Keyword burst analysis or co-occurrence and cluster analysis can present hotspots, which are representative of a certain type of keywords with common characteristics. The use of hotspots is more helpful to analyze the overall development trend of IAHS research. Therefore, when using CiteSpace, hotspots are generally used as a vocabulary to predict trends [17].

In CiteSpace, the centrality of a node is a graph-theoretical property that quantifies the importance of the node’s position in a network. A commonly used centrality metric is the betweenness centrality [19]. It is based on TF*IDF (emphasizes the mainstream of research, and generally generates cluster tags based on the title of the citing documents), log-likelihood rate (LLR is bigger, the word is more representative), and mutual information. The betweenness centrality of a node refers to the number of the shortest path through the node in a network. The greater the betweenness centrality of a node in the network is, the greater it plays the role in the communication between other nodes. The following formula is used to calculate it [20]:

\[ C_B(v) = \sum_{s \neq v \neq t \in V} \frac{\sigma_{st}(v)}{\sigma_{st}} \]

where “\( \sigma_{st} \)” represents the number of shortest paths from node “s” to node “t”, and “\( \sigma_{st}(v) \)” represents the number of nodes “v” in the shortest path from node “s” to node “t”. The value of betweenness centrality of a standardized node is between 0 and 1. The lower the betweenness centrality is, the more it is at the edge of the network, and the cooperation with other nodes needs to be strengthened [19]. The betweenness centrality of more than 0.1 is regarded as a key node. The betweenness centrality of the purple outline \( \geq 0.1 \) indicates that the node is a particularly important key node.

The equation \( N_1 = 0.749 \times (N_{\text{max}})^{1/2} \), where \( N_1 \) is the minimum number of papers the author should publish, and the \( N_{\text{max}} \) is the paper number that the first core author published. Authors with more than \( N_1 \) published papers are core authors in the field of agricultural technology [20]. In addition, network density refers to the closeness of the cooperative network, and closeness relates to the number and thickness of the lines of the cooperative relationship in the network. It is usually reflected by the closeness of the connection between nodes. It is not a fixed standard. The smaller the value is, the more dispersed the network is; on the contrary, the larger number is, the closer the network connection. Centrality metrics provide a computational method for finding pivotal points between different specialties or tipping points in an evolving network [16]. Cited Author: the author’s co-citation analysis. The author’s co-citation refers to the phenomenon that two authors are jointly cited by other documents. The Citespace software only considers the co-citation of the first author when calculating the author’s co-citation. Cited Journal: Co-citation analysis of journals. Co-citation of journals refers to the phenomenon that two journals are cited by the same paper. Co-citation of journals reflects the relevance of various journals and disciplines. Other related terms in this review are from the article published by Chen et al. They can also be found in related literature or books [17]. These maps represented the research contents and hotspots in the IAHS field.
3. Results

3.1. Analysis on the Research Progress of IAHS

3.1.1. Changes in the Number of Publications

In order to grasp the overall development trend of GIAHS in the 15 years from 2006 to 2020, the tendency of GIAHS publication in the past 15 years was directly derived from the Web of Science core collections. The search results are presented in Figure 1. The literature on the IAHS showed a fluctuating and rising trend from 2006 to 2020 (Figure 1). In 2006, only seven articles related to IAHS were published, which are just simple introductions to GIAHS. In 2020, 54 articles were published. According to the fluctuation trend of the literature number, international research on IAHS could be divided into two stages. The first stage was the fluctuating increase stage from 2006 to 2014. The published literature number was relatively small and showed changing trends that rose at first and then fell slowly, roughly below 20. In this stage, there were two peaks, one each in 2007 and 2013. This indicated that the IAHS research was in the primary stage between 2006 and 2014 years. Just a small part of scholars who worked or studied in those organizations that participated in the GIAHS initiative conducted IAHS research. The second stage was from 2014 to 2020. The amount of published literature increased steadily, indicating that the IAHS was developing and receiving more and more concern. More scholars in the world paid attention to the IAHS and studied the IAHS from different perspectives. This stage showed IAHS research was coming into a fast developmental period.

![Annual distribution of international IAHS research publications between 2006 and 2020.](image)

3.1.2. Analysis of Issuing Countries and Institutions

In order to grasp the trend of cooperation between different countries, the influence of the countries in IAHS field, when the exported literature was analyzed, the Country option was selected in the node types column of the CiteSpace5.5R2 software, and the time was set 2006–2020. The country cooperation map was obtained, as shown in Figure 2 and Table 1. Based on the social network analysis function of the CiteSpace software, the social network relationships among different countries/institutions in the field of IAHS were explored at the macro and medium levels, which could directly reflect the cooperation situations between different countries/institutions in the field of IAHS to a certain extent and show the influence of a country/institution in this field [21]. The CiteSpace cluster diagrams can reflect the structural characteristics of clusters and highlight key nodes and important connection relationships.

Each node in the network diagram represents a country, and the connecting line represents the international situation between the two different countries. The bigger the size of the annual ring is, the greater is the number of the published literature. The thicker the line is, the is closer the cooperation between two different countries [17]. With “country” as the network node, 27 nodes and 125 connecting lines were generated in the diagram. They showed that authors publishing papers on IAHS were from 27 countries from 2006 to 2020. The diagram of cooperation on IAHS between different countries was 0.3561 regarding network density (Figure 2). The order of the 10 countries that published the most literature on IAHS was China, Italy, the USA, Australia, England, Germany, Spain, Japan, France, and Canada (Table 1). According to the thickness of the connecting lines, it could
be observed that England and Italy had more papers with other countries and had a higher degree of tightness. However, China had a low degree of cooperation with other countries (Figure 2, Table 1).

![Figure 2. Map of the international situation on IAHS research between 2006 and 2020.](image)

**Table 1.** The 2006–2020 high-yielding countries of international IAHS.

| The Serial Number | Count | Centrality | Country   | Proportion |
|-------------------|-------|------------|-----------|------------|
| 1                 | 70    | 0.00       | China     | 23.97%     |
| 2                 | 38    | 0.15       | Italy     | 13.01%     |
| 3                 | 37    | 0.11       | The USA   | 12.67%     |
| 4                 | 25    | 0.07       | Australia | 8.56%      |
| 5                 | 22    | 0.19       | England   | 7.53%      |
| 6                 | 17    | 0.10       | Germany   | 5.82%      |
| 7                 | 17    | 0.01       | Spain     | 5.82%      |
| 8                 | 16    | 0.04       | Japan     | 5.48%      |
| 9                 | 16    | 0.04       | France    | 3.42%      |
| 10                | 10    | 0.02       | Canada    | 3.42%      |

Among them, China was the one that published the most papers on IAHS research (70 papers), accounting for 23.97% of the total literature. It was far more than any other country. It was followed by Italy, the USA, and Australia, accounting for 13.01%, 12.67%, and 8.56% of the total literature, respectively. The centrality means the importance of a node in a network (Table 1). The centrality of a node measures the percentage of the number of shortest paths in a network toward a given node [19]. The greater the relevance degree of the node is, the higher the centrality of it is, and the stronger the importance of the node is in this field [17]. The centrality of Italy and the United Kingdom were 0.15 and 0.19, respectively, which indicates that the United Kingdom and Italy had greater cooperation with other countries in the research of IAHS. While China had a high number of papers, its centrality was low (centrality of 0.00). This indicated that China had weak cooperation with other countries in IAHS research.

A general grasp of the high-level GIAHS international research institutions is conducive to clarifying the general situation of the distribution and international cooperation of the institutions studying GIAHS. Hence, this research utilized institutions as search
terms to search GIAHS related literature in CiteSpace 5.5R2. With institution taken as the network nodes, 42 nodes were generated in the diagram, which indicated 42 core research institutions in the field of IAHS studies. These core research institutions were in many core cooperative network relationships. Chinese institutions include the Chinese Academy Sciences, University of Chinese Academy Sciences, Chinese Academy of Agricultural Sciences, Beijing Union University, Renmin University of China, and China Agricultural University. Representative offices in other countries include the University of Florence, University of Padua in Italy, and CSRIO in Australia, University of Arizona in the USA, etc. (Figure 3, Table 2).

Figure 3. Productive academic organizations in international IAHS research between 2006 and 2020.

Table 2. The institutions which published more than 4 papers on IAHS between 2006 and 2020.

| Serial Number | Centrality | Institution             | Affiliation |
|---------------|------------|-------------------------|-------------|
| 1             | 0.49       | Chinese Acad Sci China  |             |
| 2             | 0.02       | Univ Chinese Acad Sci China |       |
| 3             | 0.00       | Univ Florence Italy      |             |
| 4             | 0.00       | Univ Padua Italy         |             |
| 5             | 0.01       | CSIRO Australia          |             |
| 6             | 0.00       | China Agr Univ China     |             |
| 7             | 0.00       | Chinese Acad Fishery Sci China | |
| 8             | 0.00       | Univ Arizona USA         |             |
| 9             | 0.00       | Zhejiang Univ China      |             |

From 2006 to 2020, the field of IAHS research involved 42 major research institutions. Four research institutions had published more than five papers, accounting for 18.84% of the total published papers. The Chinese Academy of Sciences had the largest number of published papers, accounting for 10.27% of the total number, followed by the University of Chinese Academy of Sciences, University of Florence, University of Padua, and CSIRO. Among them, the centrality of the Chinese Academy of Sciences in China was the highest one, at 0.49, indicating that it had a relatively high influence in the field of IAHS research. The University of Florence and the University of Padua also published a lot of papers. (Table 2).

3.1.3. Analysis of Author Group Characteristics

Statistics on the distribution of relevant authors in the field of IAHS can reflect the scholars’ publications and their contributions to the field at a micro level and provide references for scholars in the field of IAHS to evaluate and read related literature. To select
the author option in the node types column of the CiteSpace 5.5R2 software, the time 2006–2020 was set and the “go” cluster was selected; this study obtained the productive authors map as shown in Figure 4 and the Table 3. In the drawn diagram, the annual ring sizes of the nodes indicated the number of posts. The larger the node was, the greater the number of papers published in the year was. The connections between the nodes indicated the cooperative relationship between different authors. The thicker the line was, the closer cooperation between the two authors was.

Figure 4. Productive authors international IAHS research between 2006 and 2020.

Table 3. The authors who published more than 4 papers on IAHS between 2006 to 2020.

| Serial Number | Count | Centrality | Authors              | Proportion |
|---------------|-------|------------|----------------------|------------|
| 1             | 24    | 0.10       | Min, Q.              | 8.22%      |
| 2             | 12    | 0.01       | Yang, L.             | 4.11%      |
| 3             | 7     | 0.01       | Zhang, Y.            | 2.40%      |
| 4             | 6     | 0.00       | Liu, M.              | 2.05%      |
| 5             | 5     | 0.00       | Jiao, W.             | 1.71%      |
| 6             | 4     | 0.00       | Venturi, M.          | 1.37%      |
| 7             | 4     | 0.00       | Agnoletti, M.        | 1.37%      |
| 8             | 4     | 0.00       | Santoro, A.          | 1.37%      |
| 9             | 4     | 0.00       | He, L.               | 1.37%      |

The purple outline around the node indicates that the author has a strong betweenness centrality. According to the results of the analyses, many cooperative groups had been formed, namely, Group 1: Min, Q., Yang, L., Zhang, Y., Jiao, W., Zhang, C., etc.; Group 2: Xie, J., Luo, S., Hu, L. [22], etc.; Group 3: Santoro, A., Agnoletti, M., Venturi, M., Tucci, G. [23], etc. (Figure 4).

The purple outline around the author Min, Q. node was obvious, indicating that it had a strong betweenness centrality in countries or regions related to him. He is a regional bridge between different author communities or institutions. He has strong information control capabilities and is a disciplined leader in the field of IAHS. A red circle appeared in the collaboration network centered on Min, Q. The red circle appeared from 2015 to 2017. The number of papers published by this group had a sudden increase (Figure 4). In addition to Chinese author groups, American authors such as Fuller, A. etc., and Canadian authors Wall, G. etc., both established a certain degree of cooperation with Chinese authors. The Italian authors Santoro, A., etc., formed a close network with Tunisia and El Salvador [24,25], which showed that Italy also had productive authors.
GIAHS international cooperation was gradually increasing. Furthermore, it could be seen from authors’ relationships that authors from Japan including Kohsaka, R., Uchiyama, Y., Kajihara, H., etc., also established regional contacts with authors from South Korea, such as You, W.H., as well as from China [4]. Core author groups have a function of leading and promoting discipline development. According to the calculation methods of the number of papers studied according the scientific historical value, we can establish the criterion identifying the core authors. According to relevant statistics on the authors’ publications from 2006 to 2020, among the 292 papers, the author who published the most papers was Min, Q., who published 24 papers. Therefore, $N_{\text{max}}$ is 24, and $N_{1} \approx 4$. The author who published four papers was the core author in the IAHS field [19]. It was calculated that nine scholars were core authors in the field of IAHS. The total number of articles papers published by them was 70, accounting for 23.97% of the field of international IAHS. Core author group formations required that core author publications consisted of 50% of total papers in a research field. This proportion did not meet the publication standard. Therefore, a core author group has not been formed in the IAHS research field.

### 3.1.4. Cited Authors and Journals

To systematically learn about the authors and publication status, the cited-author and cited-journal option were selected in the node types column of the CiteSpace 5.5R2 software, and the time was set as “2006–2020”; the cited authors and cited journals network graph were obtained, as shown in Tables 4 and 5, after the software was run. They revealed the academic community in a research field. Through the analysis of journal co-citation, the knowledge base of a research field can be obtained [17]. Papers without authors were cited 40 times. The papers authored by Altieri, M.A. and FAO were cited 28 times. *Agriculture Ecosystems & Environment* was the most cited journal, which was cited 81 times. Its impact factor was 5.086 between 2018 and 2020. The ranks of different influential authors and journals are listed in Tables 4 and 5.

#### Table 4. Top 8 cited authors in the literature.

| Cited Times | Centrality | Cited Author Name |
|-------------|------------|-------------------|
| 40          | 0.03       | Anonymous         |
| 28          | 0.04       | Altieri, M.A.     |
| 28          | 0.01       | FAO               |
| 25          | 0.01       | Sun, Y.H.         |
| 21          | 0.03       | Liu, M.C.         |
| 19          | 0.01       | Min, Q.W.         |
| 16          | 0.13       | Koohafkan, P.     |
| 16          | 0.12       | Zhang, Y.         |

#### Table 5. Top 8 cited journals.

| Cited Times | Centrality | The Impact of Factors (Three Years) | Cited Journal Name |
|-------------|------------|-------------------------------------|--------------------|
| 81          | 0.15       | 2018: 3.954; 2019: 4.241; 2020: 5.567 | *Agriculture Ecosystems & Environment* |
| 72          | 0.04       | 2018: 3.573; 2019: 3.682; 2020: 5.398 | *Land Use Policy* |
| 64          | 0.16       | 2018: 9.580; 2019: 9.412; 2020: 11.205 | *Proceedings of the National Academy of Sciences of the United States of America* |
| 63          | 0.05       | 2018: 4.865; 2019: 5.647; 2020: 6.789 | *Journal of Environmental Management* |
| 61          | 0.08       | 2018: 41.063; 2019: 41.846; 2020: 47.728 | *Science* |
| 58          | 0.06       | 2018: 5.144; 2019: 5.441; 2020: 6.142 | *Landscape and Urban Planning* |
| 58          | 0.08       | 2018: 2.592; 2019: 2.576; 2020: 3.251 | *Sustainability* |
| 52          | 0.13       | 2018: 43.070; 2019: 42.779; 2020: 49.962 | *Nature* |
3.2. Cluster Analysis of Research Hot Words

Keywords represent research hotspots and trends in the research field. Sorting keywords according to word frequency can help scholars understand the hot words in this field and the words with higher influence. When the exported literatures were analyzed by CiteSpace 5.5R2, keyword option was selected in the node types column, and the time was set as “2006–2020”. The country cooperation map is shown in Table 6.

| Serial Number | Count | Centrality | Keyword                        |
|---------------|-------|------------|--------------------------------|
| 1             | 36    | 0.17       | management                     |
| 2             | 34    | 0.17       | landscape                      |
| 3             | 32    | 0.12       | conservation                   |
| 4             | 25    | 0.08       | system                         |
| 5             | 22    | 0.05       | biodiversity                   |
| 6             | 22    | 0.25       | climate change                 |
| 7             | 21    | 0.10       | land use                       |
| 8             | 19    | 0.08       | sustainability                 |
| 9             | 18    | 0.21       | impact                         |
| 10            | 18    | 0.01       | GIAHS                          |
| 11            | 17    | 0.13       | China                          |
| 12            | 17    | 0.11       | ecosystem service              |
| 13            | 15    | 0.03       | agricultural heritage system   |
| 14            | 15    | 0.11       | agriculture                    |
| 15            | 13    | 0.04       | diversity                      |
| 16            | 11    | 0.01       | heritage                       |
| 17            | 10    | 0.01       | terrace                        |
| 18            | 10    | 0.04       | tourism                        |
| 19            | 10    | 0.05       | framework                      |
| 20            | 9     | 0.03       | water                          |

Sorting 256 keywords from 2006 to 2020 according to word frequency, the results denote the number of papers containing a keyword. The word management had the highest frequency, followed by landscape, conservation, system, biodiversity, climate change, land use, sustainability, impact, GIAHS, China, ecosystem service, agricultural heritage system, etc. (Table 6). Among them, keywords such as management, landscape, conservation, climate change, land use, impact, China, ecosystem service, and agriculture had strong centrality. Their betweenness centrality was above 0.1, and the frequency of occurrence was relatively high, indicating that many papers referred to these words. The 20 high-frequency keywords corresponded to the five major standards of GIAHS. In the field of GIAHS [2], scholars mostly studied heritage management, heritage landscapes, heritage land use, heritage water resources and heritage terrace, etc. This research was related to the characteristics of remarkable landscapes, land, and water resources management. Scholars also studied heritage biodiversity, heritage ecosystem service, heritage diversity, heritage climate change, and heritage sustainability, etc. They corresponded to the GIAHS characteristic of biodiversity and ecosystem function. In addition to the heritage framework, research was related to the characteristics of having food and livelihood security, because it involved the framework of sustainable livelihoods and so on. In addition, scholars mostly studied heritage tourism, heritage systems, agricultural heritage systems, heritage in China, etc. They corresponded to the characteristics of cultures, value systems, and social organizations (Agriculture). Finally, scholars also studied heritage conservation, traditional knowledge system research, etc. These words corresponded to the characteristics of knowledge systems and adapted technologies.

A visual cluster analysis on the keywords of international IAHS can determine the hotspots in the field of IAHS based on CiteSpace software. The timeline chart focuses on the relationship between clusters and the historical span of the documents in a certain
In order to interpret the international IAHS keywords from the time dimension, this study used the timeline chart function in the CiteSpace software to distribute the keywords on the time axis according to the time they appeared. After the clustering was completed, the timeline view option in the control panel was selected for the timeline map, as shown in Figure 5. Annual ring circles on each horizontal axis in the figure were crossed. The larger they were, the more frequently the article was cited. The cluster labeled on the right reflected themes of the IAHS research fields.

![Timeline of keywords co-occurrence of international IAHS from 2006 to 2020.](image)

Figure 5. Timeline of keywords co-occurrence of international IAHS from 2006 to 2020.

According to the changes of high centrality keywords in the cluster over time, a timeline chart was drawn as shown in Figure 5. The research hotspot keywords focusing on the timeline chart were #0 agricultural heritage system, #1 regeneration, #2 agriculture, #3 agroforestry, #4 dry-stone wall, #5 social capital, #6 non-stationarity, and #7 agrobiodiversity.

On the timeline of “#0 agricultural heritage system”, the first cluster keyword that appeared in 2008 was land use [27]. Related keywords gradually increased over time, including culture, China, landscape use, landscape, terraces, etc. The keywords appeared in 2006–2019, including landscape use, China, terraces. The latest keywords in 2020 were terraced landscape, nitrogen balance, site. It could be seen that the earliest international research on IAHS was mainly aimed at the development of the system landscapes [28,29] and initially focused on the methods of landscape utilizations [30,31]. Then, international research on IAHSs gradually focused on the development of national or regional landscapes represented by China [32] and later focused on the research of certain forms of landscapes such as terraced landscapes [33,34]. In recent years, the latest research direction has developed in the field of balance of ecological elements such as nitrogen balance in climate change, and it has focused on the choice of sites for the IAHS [35].

On the timeline of “#1 regeneration”, the first word “conservation” appeared in 2011 [32]; biodiversity appeared in 2011, and ethnobotany, food security, and the cultural landscape appeared in succession in 2012–2017. Traditional agriculture, soil, value, and agroecosystem appeared in 2018–2020. The regeneration of IAHS in the early years focused on regeneration protection and the perspective of the protection of biodiversity to promote regeneration [28,36]. It was gradually specific to the regeneration of abstract materials, including
food safety, heritage, knowledge, and cultural landscape [36]. Then it mainly focused on the regeneration of IAHS transitions to the regeneration of agricultural production factors, such as the regeneration of traditional knowledge and the soil of IAHS sites. Later, it gradually expanded to value regeneration and ecosystem regeneration [37].

On the timeline of “#2 agriculture”, the first word “sustainability” appeared in 2012 [38]; climate change appeared in 2015; river basin, resilience, and agriculture appeared in 2016; Spain appeared in 2017; and adaptation appeared in 2018. Strategy and quality were the latest words in 2020. It showed that in the study of IAHS, for agricultural issues, scholars first paid attention to the development and protection of rural areas and environmental issues [39]. The research perspective ranges were from a global macro perspective such as climate change, to a regional medium perspective, including research on regional changes [40], and to a micro perspective of the agricultural production systems, such as the improvement of agricultural quality and solutions [41], etc. The main research was about the impact of IAHS on the adaptability, resilience [33], and sustainability of global agricultural changes.

On the timeline of “#3 agroforestry” [24,42], the first word “system” appeared in 2006 [30]; Management, Europe, region, and food, etc., appeared in succession in 2012–2017. The latest words, traditional knowledge, satoyama, and service, appeared in 2020. The research of the IAHS mainly focused on the system itself and system management. The development of the IAHS started from the wealth and management methods of the original IAHS itself to individual elements related to the development of the IAHS. From the development of the primary industry, it gradually extended to the secondary and tertiary industries. It gradually extended from the global system managements to a regional one and then to the one in a certain location [43,44]. The content level ranged from the earliest general system functions and management levels to the later specific research on tourism and traditional knowledges in the case area [25,45].

On the timeline of “#4 dry-stone wall”, the first word “ecosystem service” [46] appeared in 2014; prediction, runoff, cultural heritage, abandonment, and perception appeared in succession in 2015–2019. The latest words, agricultural system and life cycle assessment, appeared in 2020. Under this theme, natural factors research and landscape research occupied an important proportion of the development of the IAHS. The series of articles on “dry-stone wall” mainly focused on the ecosystem services, runoff, landscape [23], cultural heritage, and abandonment of dry-stone walls [39]. International IAHS research about “dry-stone wall” started from the characteristics of “dry-stone wall” systems to changes and existing problems of “dry-stone wall” systems, and then they focused on the study of changes in the entire life cycles [33].

On the timeline of “#5 social capital”, the words “storage” and “water” appeared in 2007 [47]; stakeholder, West Africa, forest, Bangladesh appeared between 2014 and 2015. The word “GIAHS” appeared in 2018 and the latest word “denitrification” appeared in 2020. The development of social capital research expanded from the microscopic view of resources to the impact of regions and people. Later, it mainly focused on the development of climate elements and the development of GIAHS [48]. The human element often involved the natural conditions of the heritage site itself and the distribution of benefits for the residents and related stakeholders of the heritage site. Currently, it was extended to the research on the improvement and optimization of livelihood strategies from the perspective of capitals and incomes [49]. What ran through the entire research were the impact of natural resources. For example, water resources, as a necessity for tourists in the process of tourism, played a role in supporting the sustainable development of the IAHS [50].

On the timeline of “#6 non-stationarity”, area appeared in 2014 [34], and denitrification appeared in 2020. The research on the instability of IAHS mainly focused on instability of climate change [51]. The research focused on a short period. The research focused on the instability of geographical elements of IAHS. The uncertainty range was from a large geographic model to a specific geographic model in a certain field [52].

On the timeline of “#7 agrobiodiversity”, the first word “dynamics” appeared in 2011 [43]; “agrobiodiversity” appeared in 2013; “farmer” appeared in 2016; “seed exchange network"
appeared in 2019. In terms of IAHS agrobiodiversity, the research methods were related to dynamics [53], and the research objects were farmers [54]. The research content ranges were from the overall research of agricultural biodiversity to the maintenance of agricultural agrobiodiversity, and the protection of agricultural biodiversity through germplasm exchanges [55].

3.3. Analysis of the Emergence of Keywords in the Study of International IAHS

Emergent words refer to the words that appear frequently in a short period, which can reflect the hotspots of scholars in the field during a certain period. They can help scholars to judge the evolution and development trend of the field during that period. CiteSpace can detect the keywords in the field according to the word frequency changes of burst words. The research hotspots and trend changes in the field can be judged based on the word frequency changes of burst words [17]. The sudden changes can reflect the research hotspots that scholars focus on in the field during this period. We can judge the evolution and development trend of the IAHS field according to them [56]. This article sets top \( n = 20 \) in CiteSpace 5.5R2 software; “Keyword” indicates that the node type is a keyword; “Year” indicates a year when the corresponding node appears; “Strength” indicates the magnitude of the corresponding emergence intensity; “Begin” indicates the time when the emergence started; “End” indicates the emergence.

At the end of the time, the top 19 emergent words are shown in the Figure 6. The red line in the highlighted image indicated the duration of the keywords. According to the stage changes of keywords, it could be divided into the following four stages: The first stage was the initial stage of IAHS research (2006–2013). In this stage, research hotspots of IAHS mainly focused on management, biodiversity, and diversity. It discussed the characteristics and utilizations of IAHS from a macro perspective [14,29]. In the second stage, research hotspots of IAHS mainly focused on the heritage, environment, uncertainty, area, and forest from 2013 to 2015. In this stage, research hotspots tended to study the natural environments and regional issues [57]. The third stage was from 2015 to 2017. The research hotspots mainly focused on impact, climate change, diversification, sustainability, region, and perception, etc. In this stage, research began to focus on the regionality of the research and the cognitive problems of the farmers in the research area [58]. The fourth stage was from 2017 to 2020. Research hotspots mainly focused on cultural heritage, framework, pattern, sustainable development, and GIAHS. More and more scholars were aware of the problems on protection and development models of IAHS and its systems, and their research began to focus on the inheritance, development, and value of IAHS [59,60].
3.4. Co-Occurrence Cluster Analysis of Subject Terms

The cited documents of the literature dataset reflect the knowledge base of the field. Research on the subject clustering of cited documents reveals the frontier knowledge of the research field and the important knowledge turning points of evolution. It also clarifies the relationship between research frontiers [17]. Therefore, in order to help us to understand the development trends of GIAHS themes and the current states of frontiers, this research set the period for 1 year and obtained the cluster map of topic words using the log-likelihood ratio algorithm, as shown in Figure 7. The red font of the cluster map showed the hot topic words from 2006 to 2020, and then a topic word co-occurrence time map was drawn according to the time evolution. The author and the published time on each horizontal axis indicated that authors corresponded to the topic on the right side of the horizontal axis and the time when the topic document related to the author was first cited. Through the study of topic words clustering and temporal co-occurrence map, there were four good results in the international IAHS research topic clusters from 2006 to 2020 (Figure 7). It should be 0–9. The smaller the number is, the more topic words are included in the cluster. Each cluster is composed of multiple closely related words. Other clustering effects were not good and could not be prominently displayed in the results, so there were only four topics (number 0, 2, 4, 9). The color on the time axis is related to the citing document pointed to by the node, representing different years. The same color connects authors who have collaborated on the same theme in different years [16]. These clusters indicated the research hotspots of IAHS in the past 15 years. They included #0 cluster globally important agricultural heritage systems; #2 cluster tourism; #4 cluster livelihood assets; #9 cluster: direct georeferencing.

#0 globally important agricultural heritage systems. Combined with the analysis of relevant citation frequency, the core documents focused on issues such as the inheritance mechanism of traditional knowledge in heritage sites, the dynamic adaptation of heritage and protection strategies, and tourism development and utilization of heritage resources [32,33].

#2 tourism. In the core literature, scholars mainly focused on the relationship between tourism and farmers’ livelihood capital [61], and sustainable development of tourism resources. In terms of livelihood capital, it focused on studies of ecological compensation and government policies on the sustainability of livelihoods. In terms of tourism resources and sustainable development, it mainly focused on impacts of tourism resources on sustainable incomes and livelihood sources of farmers, as well as the identification, and development and protection of tourism resources.
#4 livelihood assets. The core documents aimed at the capital element input of community residents, including farmers’ livelihood capital measurement, farmland utilization, sustainable livelihoods, labor transfer, and other issues. Research methods included case analysis, coupling measurement, etc. [62].

#9 direct georeferencing. The core documents focused on remote sensing technology measurement, topographic map time and space measurement, hydrological models, rainfall runoff models, and other perspectives. The core papers focused on the direct use of geographic measurement tools and methods in the field of IAHS and the mechanism of geographic measurement tools and methods for the development of IAHS [26,52].

Overall, from the perspective of co-occurrence cluster analysis, current GIAHS research focused on the comprehensive research of the GIAHS protection and sustainable development. They also focused on several special fields of research including tourism, livelihood assets, and geographical information analyses in IAHS sites.

4. Conclusions and Prospects
4.1. Conclusions
This research used the bibliometrics visual analysis software CiteSpace5.5.R2 to analyze 292 papers on IAHS research in the Web of Science database and formed a visual network analysis map, including the distribution of authors, institutions and countries, and the distribution of keywords, topic word distribution, etc. Our analyses clarify the basic overview of international IAHS research from 2006 to 2020 based on the visual distribution of authors, institutions, and countries. On this basis, the subject words and keywords of IAHS were discussed, and the research trends and hotspots of IAHS were deeply analyzed. The main conclusions are as follows:

4.1.1. Known Results
(i) In terms of the publication time and quantity changes, international IAHS research from 2006 to 2020 can be summarized into two stages: fluctuating increase stage...
(2006–2014); and steady growth stage (2014–2020). The overall trend was increasing, but the number of publications was still relatively weak compared to other disciplines.

(ii) At the research institution level, many networks of institutions studying GIAHS have been formed. They included the Chinese Academy of Sciences, the university of Florence, the university of Padua, CSIRO, China Agricultural University, the University of Arizona, etc. Among issuing countries, the order of the number of papers was China, Italy, the USA, Australia, England, and Germany. The number of papers issued by China was relatively high, but the centrality was low, indicating that China needs to strengthen international cooperation in research and enhance the international influence of research on GIAHS.

(iii) At the author level, IAHS research mainly had many author groups. Among them, author groups of China, Italy, Japan, the USA, etc., played an important role in the development of international GIAHS. However, there is still no core author group in the world. In sum, the breadth of international cooperation in the research field has much room for improvement.

(iv) In terms of highly cited authors and cited journals in the core collection of Web of Science, since 2006, anonymous papers were most cited at 40 times. The papers authored by Altieri and FAO accounted 28 citations. Agriculture Ecosystems & Environment was the most cited journal, which was cited 81 times. Its impact factor was 5.086 between 2018 and 2020. In terms of research keywords, the keywords of international IAHS research mainly focused on agricultural heritage systems, regeneration, agriculture, agroforestry, dry-stone wall, social capital, instability, agricultural biodiversity, etc. In terms of research topics, the 2006–2020 international IAHS research mainly focused on globally important agricultural heritage systems, tourism, livelihood assets, direct georeferencing, etc. On the whole, there were many and more concentrated papers on the research of IAHS based on geography, tourism, capital endowment, and biodiversity.

4.1.2. Unexpected Results

In addition, this article also found some connections and differences in spatial distribution by analyzing the cited documents.

(i) The study found that the geographical distribution of GIAHS study authors was mainly in Asia, such as China, Japan, India, etc.; and in Europe, such as Italy, Britain, Germany, France, Sweden, Spain, Denmark, Belgium, etc. Africa was mainly concentrated in the regions of South Africa and Ethiopia. The Oceania region included Australia; the America region included North America, including the United States, and South America, including Chile, Brazil, etc.

(ii) More representative authors were distributed in China, Japan, Italy, Germany, France, the United States, and Australia. Scholars from various regions had their own focuses of writing papers. Scholars in the United States were more inclined to study the agricultural heritage systems in other countries or regions, such as agricultural cultural heritages in Africa [63,64] and Europe [65], especially in Africa, but to do few in their own countries. They also liked to study and compared agricultural heritage of cosmopolitan or local urban farms. Research contents included biodiversity and traditional agricultural systems [66], agricultural policies [65], food security [63], geographic exploration [64], etc. This is because the United States is an early industrial heritage country with relatively little agricultural heritage. In addition, Australian authors had also their own features in IAHS research. They were more inclined to study water pollution, recycling, and environmental pollution near the World Heritage site, the Great Barrier Reef [67,68]. Perhaps due to the long coastline of Australia, the Great Barrier Reef as the largest ecosystem in Australia is rich in biodiversity, so its water quality issues naturally attracted attention. In the Asian region, Japan and China had a rich agricultural heritage and their GIAHS projects started earlier, so authors studied heritage in a more comprehensive range. Early research in Japan...
mainly focused on agricultural products and toursisms, ecosystems, environmental management, etc. [53,69,70], and later studies focused on landscapes, etc., including the “Satoyama” system, which was a regional unit that developed agriculture, forestry, and fishery activities on the lands with Satoyama as the center [71]. Research contents of China included rice–fish systems and so on [22]. Representative countries in Europe included Italy, Germany, Spain, and France. Italian scholars often concentrated on writing in a certain area, and the research content was relatively extensive, mainly including ecosystem services, biodiversity, sustainable development, policy management measures, etc. [41,57,72]; German scholars tended to use vineyards as case sites in related research [73], and the content was mainly about biodiversity, landscape, etc. [29,74]. This phenomenon may be related to the abundance of wine in Germany. In addition, due to the better natural scenery in Spain, Spanish scholars tended to study landscape use [30]; French scholars tended to study the terms of biodiversity [75]. Authors in Africa did not form a large cluster, and the research content mainly focused on traditional knowledge [76].

(iii) In addition, various countries had connections in spatial research. As mentioned earlier, the United States and Africa were linked in GIAHS research. British scholars usually also studied the agricultural heritage of other countries such as Egypt and Turkey because of the early industrial development in England, and therefore established relevant social networks with these countries [77,78]. In terms of research content, both Chinese scholars and Australian scholars conducted research on the sustainable development of rice [22,79]. In grassland management, France and Australia also established a content network structure [47,80]. Similar to German research, Italy also conducted related research on vineyard-related biodiversity and economic development [81]. In some regions, real across-country cooperation has been conducted. In October 2013, China, Japan, and South Korea agreed to the Chinese proposal to establish the East Asia Research Association for Agricultural Heritage Systems (ERAHS). The ERAHS conference has been organized every year since 2014, except for 2020, with three countries rotating as the host country [4]. Therefore, based on the differences and connections between different regions in terms of space, GIAHS should strengthen spatial connections in the future.

(iv) Different GIAHS forms in different countries and regions result in their different management and development approaches of GIAHS. Asia, Japan, South Korea, and China had very similar natural conditions, but GIAHS types in Japan were relatively rich, and various reasonable multi-stakeholder participation mechanisms have been built in different GIAHS sites. Therefore, it had advantages in urban agriculture and historical and cultural inheritance. For example, cooperative networks of GIAHS organized spontaneously by governments in GIAHS sites played an important role in promoting the development and protection of GIAHS in Southeast Asia [11]. In Europe, vineyards and botanical gardens were main types of GIAHS. Spain and Italy were the regions where GIAHS were distributed. Management measures of governments were top-down, government-oriented, and had relatively specific ways. In America, the research on GIAHS mainly focused on suburban agricultural protection and urban farms because of the earlier industrial development. Moreover, Italy and China both have many types of heritages related to agriculture, so they could help each other in cross-regional sustainability. Other countries or regions that had similarly weak policy support could learn from GIAHS in Japan.

4.1.3. Significance

Based on visual analyses of Chen, C.M. and a large number of key international GIAHS documents cited [17], by using visible analytical approaches, this research could directly reflect the development of GIAHS trends over the past 15 years. Furthermore, this research could present the latest research trend of this field by visualization research in the GIAHS field. It helps researchers to form a clearer understanding of the field. It
can help scholars in different countries to carry out the latest international exchange and cooperation of IAHS. Finally, through analyses of the characteristics of spatial distribution and cross-regional government management based on cited literature, this study finds interesting characteristics of the temporal and spatial distribution of GIAHS, for example, similarities and differences of GIAHS development in different regions. These results can promote the improvement of GIAHS theory and the actual sustainable development.

4.2. Potential Limitations

Although this study depicted the general international situation of GIAHS in terms of time and space in the past 15 years and provided good guidance for the development of IAHS in the world, it still had limitations in the use of methods, the validity of the research scope, and the analysis of results. They are shown as follows:

(i) This research method adopts bibliometrics and all results are based on CiteSpace algorithms. Using this method helps to clearly analyze trends of IAHS research fields in a visual form and predict future research frontiers. However, it can only reflect the number of papers published in the research fields and the main situations of the cooperation networks. For some cooperation, the results cannot fully reflect them. In addition, the results of this study can be verified by other visualization software like VOSviewer, Citenet, or Python. Due to different algorithms of different software, the results are probably different to some extent, but they are generally consistent. In the future, multiple software programs can be used to analyze the IAHS literature for verifying results and discussing their differences.

(ii) This study only used the core collection of the WOS database as the data source, so articles not included in the core collection of the WOS database were not analyzed. Therefore, this research may omit some studies on IAHS. However, considering the WOS core collection has a higher international influence and the number of user groups is huge, the selected WOS data can reflect the overall global research trend and current status of GIAHS. Another limitation is that IAHS in this paper is not a commonly used term in some countries. It may leave out existing studies in different regions of the world. However, using IAHS as a search term can accommodate some regions where researchers use IAHS as a research vocabulary, because in these areas, such as China, South Korea, and Japan, IAHS research includes not only GIAHS-related research but also NIAHS-related research. Therefore, using IAHS or GIAHS as a combination search term, compared to using GIAHS as a search term alone, is more complete and has more practical significance for the summary of past research and trend prediction analyses of future research in related fields. Moreover, GIAHS covers lots of elements, and the related research is very extensive. Just taking GIAHS as a search term, those professional literatures excluding the word “GIAHS” would be missed even if they consciously studied issues about GIAHS. In terms of time setting, this study set the time range as the 15 years from 2006 to 2020, and the key articles before 2006 and after 2020 were not included. However, results can still reflect the development trend of international GIAHS because of the missed literature constituting just a small proportion. In the future, a broader research scope can be found in this study.

(iii) In terms of result analyses, authors, countries, institutions, keywords, subject words, etc., were selected for analysis, and only general trends of these indicators were analyzed. More detailed analyses need further verification. In addition, this research is mainly based on the research methods of Chen, C.M., and it has some inevitable limitations in analytical methods. However, this research aims to present the general international trends of agricultural cultural heritages. The selected indicators can meet the research object. Moreover, some key documents were cited in the text to support these analytical results, which have summarized information from many key research themes. At the same time, they also supplemented connections and different features existing in the GIAHS space.
4.3. Research Prospects

According to cluster analyses of keywords and subject terms, the research directions of scholars in this field can be summarized from the cluster results, and research deficiencies and prospects of international IAHS research can be put forward.

(i) The research contents of international IAHS expand to the fields of applications and microscopic views

Current research contents mainly focus on the characteristics of IAHS, but the research on the summary, promotion, and application of the core value of IAHS is lacking. Based on current research, IAHS in the future can be extended to other fields, such as education and scientific research, popularization, and application, and can also be extended to research on a certain type of IAHS and classify IAHS.

(ii) International IAHS should strengthen research in the field of social sciences so that we can build a comprehensive disciplinary system

At present, research results of international IAHS are mainly concentrated in the fields of agriculture, ecology, plants, soil, hydrology, and other natural sciences. International IAHSs are also mainly concentrated in the fields of social science such as economics represented by living capital and assets, and tourism represented by tourism resources. IAHS is a natural–economy–society complex system [82]. In the future, the disciplines of international IAHS research should be expanded to diversified disciplines and fields such as psychology, art, management, etc., and it should seek cross-development. IAHS should build a comprehensive theoretical system in the field of IAHS to facilitate the formation of multi-angle recognition and effective protection of IAHS.

(iii) The international IAHS should strengthen the application of standardized quantitative research methods to improve the scientific nature of research processes and results

Throughout research of international IAHS, most of the studies were based on qualitative research at first. In recent years, it has gradually expanded from qualitative research to a combination of qualitative and quantitative research. Among them, the methods of geography and ecology are used more, such as keywords like dynamics, hydrological topographic models, and other perspectives, which were relatively extensive in the international literature on IAHS. However, the use of empirical methods is still rare. In the future, research methods can be extended to qualitative research such as grounded theory and use of more mature empirical routines to quantitatively study international IAHS and enrich the objectivity and feasibility of IAHS research.

(iv) Broaden international cooperation of research groups on IAHS research

Currently, China has a relatively high volume of publications but a low centrality, indicating that China needs to strengthen international cooperation and research. It also provides a reference for international IAHS research. Research on IAHS in other countries should strengthen constructions of professional teams. While ensuring the volume of publications, it is necessary to strengthen exchanges and cooperation between various countries and regions, expand the influence and strength of cooperation of the core research team, and enrich the talents of international IAHS research. Finally, comprehensive research on international IAHS should be carried out.

Author Contributions: Conceptualization, H.S. and Y.Z.; methodology, H.S.; software, H.S.; validation, H.S.; Y.Z. and Y.C.; formal analysis, H.S.; Y.Z. and Y.C.; investigation, H.S.; resources, Y.Z.; data curation, P.C.; writing—original draft preparation, P.C.; writing—review and editing, H.S. and Y.Z.; visualization, H.S.; supervision, H.S.; project administration, H.S.; funding acquisition, Y.Z. and Y.C. All authors have read and agreed to the published version of the manuscript.
Funding: This research was funded by the project “Construction of modern agricultural and industrial park for Anxi County in Fujian Province, Ministry of Agriculture and Rural Affairs, China (KMD18003A)”, the project “Fujian Agriculture and Forestry University Construction Project for Technological Innovation and Service System of Tea Industry Chain (K152005A08)”, and the project “Agricultural Science and Technology Innovation Project of Chinese Academy of Agricultural Sciences (CAAS-ASTIP-IAED-2021-06; ASTIP-IAED-2021-ZD-02)”.

Institutional Review Board Statement: Not Applicable.

Data Availability Statement: Not Applicable.

Acknowledgments: This study was funded by the project “Construction of modern agricultural and industrial park for Anxi County in Fujian Province, Ministry of Agriculture and Rural Affairs, China (KMD18003A)”, the project “Fujian Agriculture and Forestry University Construction Project for Technological Innovation and Service System of Tea Industry Chain (K152005A08)”, and the project “Agricultural Science and Technology Innovation Project of Chinese Academy of Agricultural Sciences (CAAS-ASTIP-IAED-2021-06; ASTIP-IAED-2021-ZD-02)”. The authors would like to give their sincere thanks to the editors and anonymous reviewers for their constructive comments.

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

References

1. Koohafkan, P.; Altieri, M.A. Globally Important Agricultural Heritage Systems: A Legacy for the Future; Food and Agriculture Organization of the United Nations: Rome, Italy, 2011.
2. FAO. 2017. Available online: http://www.fao.org/giahs/background/en/ (accessed on 17 September 2017).
3. FAO. Agricultural Heritage around the World, GIAHS around the World. 2020. Available online: http://www.fao.org/giahs (accessed on 20 December 2020).
4. Kajihara, H.; Zhang, S.; You, W.H.; Min, Q.W. Concerns and Opportunities around Cultural Heritage in East Asian Globally Important Agricultural Heritage Systems (GIAHS). *Sustainability* 2018, 10, 1235. [CrossRef]
5. Agnoletti, M.; Emanueli, F.; Corrieri, F.; Venturi, M.; Santoro, A. Monitoring Traditional Rural Landscapes. The Case of Italy. *Sustainability* 2019, 11, 6107. [CrossRef]
6. Zhang, Y.; Li, X.; Min, Q. How to balance the relationship between conservation of Important Agricultural Heritage Systems (IAHS) and socio-economic development? A theoretical framework of sustainable industrial integration development. *J. Clean. Prod.* 2018, 204, 553–563. [CrossRef]
7. Min, Q.W. Globally Important Agricultural Cultural Heritage—A New Type of World Heritage. *Resour. Sci.* 2006, 28, 206.
8. Kohsaka, R.; Matsuoka, H.; Uchiyama, Y.; Rogel, M. Regional management and biodiversity conservation in GIAHS: Text analysis of municipal strategy and tourism management. *Ecosyst. Health Sustain.* 2019, 5, 124–132. [CrossRef]
9. Kohsaka, R.; Matsuoka, H. Analysis of Japanese Municipalities with Geopark, MAB, and GIAHS Certification: Quantitative Approach to Official Records with Text-Mining Methods. *SAGE Open* 2015, 5, 1. [CrossRef]
10. Uchiyama, Y.; Tanaka, Y.; Matsuoka, H. Expectations of residents and tourists of agriculture-related certification systems: Analysis of public perceptions. *J. Ethn. Foods* 2017, 4, 110–117. [CrossRef]
11. Kajima, S.; Tanaka, Y.; Uchiyama, Y. Japanese Sake and Tea as place-based products: A comparison of regional certifications of GIAHS, Geopark, Biosphere Reserves, and GI at product level certification. *J. Ethn. Foods* 2017, 4, 80–87. [CrossRef]
12. Nagata, A.; Yuu, E. Ten Years of GIAHS Development in Japan. *J. Resour. Ecol.* 2021, 12, 567–577.
13. Zhang, Y.; He, L.; Min, Q. Research progress of domestic agricultural cultural heritage based on literature statistics. *Resour. Sci.* 2017, 39, 175–187.
14. Lu, J.; Li, X. Review of rice–fish-farming systems in China—One of the Globally Important Ingenious Agricultural Heritage Systems (GIAHS). *Aquaculture* 2006, 260, 106–113. [CrossRef]
15. Chen, Y.; Munteanu, A.; Huang, Y. Mapping Receptor Density on Live Cells by Using Fluorescence Correlation Spectroscopy. *Chem. A Eur. J.* 2009, 15, 5327–5336. [CrossRef] [PubMed]
16. Faust, O.; Hagiwara, Y.; Hong, T. Deep learning for healthcare applications based on physiological signals: A review. *Comput. Methods Programs Biomed.* 2018, 161, 1–13. [CrossRef]
17. Chen, C. CiteSpace II: Detecting and visualizing emerging trends and transient patterns in scientific literature. *J. Am. Soc. Inf. Sci. Technol.* 2006, 57, 359–377. [CrossRef]
18. Cheng, F.; Huang, Y.; Yu, H. Mapping knowledge structure by keyword co-occurrence and social network analysis. *Liber. Hi Tech.* 2018, 36, 636–650. [CrossRef]
19. Freeman, L.C. Centrality in social networks: Conceptual clarification. *Soc. Netw.* 1978, 1, 215–239. [CrossRef]
20. Price, D.J.; Monaghan, J.J. An energy-conserving formalism for adaptive gravitational force softening in SPH and N-body codes. *Mon. Not. R. Astron. Soc.* 2006, 374, 1347–1358. [CrossRef]
21. Chen, C.; Dubin, R.; Kim, M. Emerging trends and new developments in regenerative medicine: A scientometric update (2000–2014). *Expert Opin. Biol. Ther.* 2014, 14, 1295. [CrossRef]
22. Xie, J.; Hu, L.; Tang, J. Ecological mechanisms underlying the sustainability of the agricultural heritage rice–fish coculture system. *Proc. Natl. Acad. Sci. USA* 2011, 108, 19831–19832. [CrossRef]

23. Tucci, G.; Parisi, E.; Castelli, G. Multi-Sensor UAV Application for Thermal Analysis on a Dry-Stone Terraced Vineyard in Rural Tuscany Landscape. *Int. J. Geo-Inf.* 2019, 8, 87. [CrossRef]

24. Santoro, A.; Venturi, M.; Ben Maachia, S.; Benyahia, F.; Corrieri, F.; Piras, F.; Agnoletti, M. Agroforestry Heritage Systems as Agrobiodiversity Hotspots. The Case of the Mountain Oases of Tunisia. *Sustainability* 2020, 12, 4054. [CrossRef]

25. Santoro, A.; Aguilar, E.A.M.; Venturi, M.; Piras, F.; Corrieri, F.; Quintanilla, J.R.; Agnoletti, M. The Agroforestry Heritage System of Sabana De Morro in El Salvador. *Forests* 2020, 11, 747. [CrossRef]

26. Chen, C. Emerging trends in regenerative medicine: A scientometric analysis in CiteSpace. *Expert Opin. Biol. Ther.* 2012, 12, 593–608. [CrossRef]

27. Ren, W.; Hu, L.; Guo, L. PNAS Plus: Preservation of the genetic diversity of a local common carp in the agricultural heritage rice–fish system. *Proc. Natl. Acad. Sci. USA* 2018, 115, E546–E554. [CrossRef]

28. Cucchiaro, S.; Fallu, D.J.; Zhang, H. Multiplatform-SFM and TLS Data Fusion for Monitoring Agricultural Terraces in Complex Topographic and Landcover Conditions. *Remote Sens.* 2020, 12, 1946. [CrossRef]

29. Regina, L.; Jan, B.; Åke, B. A landscape perspective on conservation of semi-natural grasslands. *Agric. Ecosyst. Environ.* 2008, 125, 213–222.

30. Calvo-Iglesias, M.S.; Crecente-Maseda, R.; Fra-Paleo, U. A case study from NW Spain. *J. Archit. Eng.* 2006, 78, 334–343.

31. Munroe, D. Changing Rural Landscapes in Albania: Cropland Abandonment and Forest Clearing in the Postsocialist Transition. *Ann. Assoc. Am. Geogr.* 2008, 98, 855–876.

32. Sun, Y.; Cheng, S. Tourism Potential of Agricultural Heritage Systems. *Tour. Geogr.* 2011, 13, 112–128. [CrossRef]

33. Indrawan, M.; Yabe, M.; Nomura, H.; Harrison, R. Deconstructing satoyama—The socio-ecological landscape in Japan. *Ecol. Eng.* 2014, 64, 77–84. [CrossRef]

34. Qiu, Z.; Chen, B.; Takemoto, K. Conservation of terraced paddy fields engaged with multiple stakeholders: The case of the Noto GIAHS site in Japan. *Paddy Water Environ.* 2014, 12, 275–283. [CrossRef]

35. Swinton, S.M.; Lupi, F.; Robertson, G.; Hamilton, S.K. Ecosystem services and agriculture: Cultivating agricultural ecosystems for diverse benefits. *Ecol. Econ.* 2007, 64, 245–252. [CrossRef]

36. Soriano, M.A.; Herath, S. Quantifying the role of traditional rice terraces in regulating water resources: Implications for management and conservation efforts. *Agroecol. Sustain. Food Syst.* 2018, 42, 885–910. [CrossRef]

37. Kamiyama, C.; Hashimoto, S.; Kohsaka, R.; Saito, O. Non-market food provisioning services via homegardens and communal sharing in Satoyama socio-ecological production landscapes on Japan’s Noto Peninsula. *Ecosyst. Serv.* 2016, 17, 185–196. [CrossRef]

38. Rudnev, V. The factor of local cultural specificity and process of globalization. *Coll. Antropol.* 2012, 36, 1135–1138. [PubMed]

39. Brodie, J.; Pearson, R.G. Ecosystem health of the Great Barrier Reef: Time for effective management action based on evidence. *Estuar. Coast. Shelf Sci.* 2016, 183, 438–451. [CrossRef]

40. Santoro, A.; Venturi, M.; Agnoletti, M. Agricultural Heritage Systems and Landscape Perception among Tourists. The Case of Lamole, Chianti (Italy). *Sustainability* 2020, 12, 3509. [CrossRef]

41. Adams, J.B.; Taljaard, S.; Van Niekerk, L.; Lemley, D.A. Nutrient enrichment as a threat to the ecological resilience and health of South African microtidal estuaries. *Afr. J. Aquat. Sci.* 2020, 45, 23–40. [CrossRef]

42. Cullotta, S.; Barbera, G. Mapping traditional cultural landscapes in the Mediterranean area using a combined multidisciplinary approach: Method and application to Mount Etna (Sicily; Italy). *Landsc. Urban Plan.* 2011, 100, 98–108. [CrossRef]

43. Santoro, A.; Venturi, M.; Bertani, R.; Agnoletti, M.A. Review of the Role of Forests and Agroforestry Systems in the FAO Globally Important Agricultural Heritage Systems (GIAHS) Programme. *Foresis* 2020, 11, 860. [CrossRef]

44. Reyes, S.R.C.; Miyazaki, A.; Yiu, E.; Saito, O. Enhancing Sustainability in Traditional Agriculture: Indicators for Monitoring the Conservation of Globally Important Agricultural Heritage Systems (GIAHS) in Japan. *Sustainability* 2020, 12, 5656. [CrossRef]

45. Tian, M.; Min, Q.; Jiao, W.; Yuan, Z. Agricultural heritage systems tourism: Definition, characteristics and development framework. *J. Mt. Sci.* 2016, 3, 72–86. [CrossRef]

46. Barrena, J.; Nahuelhual, L.; Baez, A.; Schiappacasse, I.; Cerda, C. Valuing cultural ecosystem services: Agricultural heritage in Chiloé island, southern Chile. *Ecosyst. Serv.* 2014, 7, 66–75. [CrossRef]

47. Kemp, D.R.; Michalk, D.L. Towards sustainable grassland and livestock management. *J. Agric. Sci.* 2007, 145, 543–564. [CrossRef]

48. Diniz, F.H.; Hoogstra-Klein, M.A.; Kok, K.; Arts, B. Livelihood strategies in settlement projects in the brazilian amazon: Determining drivers and factors within the agrarian reform program. *J. Rural Stud.* 2013, 32, 196–207. [CrossRef]

49. Tian, M.; Min, Q.; Lun, F.; Yuan, Z.; Fuller, A.; Yang, L.; Zhou, J. Evaluation of tourism water capacity in agricultural heritage sites. *Sustainability* 2015, 7, 15548–15569. [CrossRef]

50. Ren, W.; Hu, L.; Tang, J. Ecological mechanisms underlying the sustainability of the agricultural heritage rice–fish coculture system. *Proc. Natl. Acad. Sci. USA* 2011, 108, 19831–19832. [CrossRef]

51. Sugimoto, R.; Kasai, A.; Tait, D.R.; Rihei, T.; Hirai, T.; Asai, K.; Tamura, Y.; Yamashita, Y. Traditional land use effects on nutrient export from watersheds to coastal seas. *Nutr. Cycl. Agroecosyst.* 2020, 119, 7–21. [CrossRef]
52. Yuji, H.; Yuki, S.; Hirotaka, T. The Minabe-Tanabe Ume System: Linkage of Landscape Units by Locals. *Sustainability* 2018, 10, 1079.

53. Thorburn, P.J.; Wilkinson, S.N.; Silburn, D.M. Water quality in agricultural lands draining to the Great Barrier Reef: Causes, management and priorities. *Agric. Ecosyst. Environ.* 2013, 180, 4–20. [CrossRef]

54. Bernues, A.; Clemetsen, M.; Elk, L.O. Seeing Northern European Fjord and Mountain Agriculture through Farmers’ Eyes. *Mt. Res. Dev.* 2016, 36, 276–285. [CrossRef]

55. Dedeurwaerdere, T.; Hannachi, M. Socio-economic drivers of coexistence of landraces and modern crop varieties in agrobiodiversity rich Yunnan rice fields. *Ecol. Econ.* 2019, 159, 177–188. [CrossRef]

56. Morar, M.; Agachi, P. Review: Important contributions in development and improvement of the heat integration techniques. *Comput. Chem. Eng.* 2010, 34, 1171–1179. [CrossRef]

57. Battaglini, L.; Bovolenta, S.; Gusmeroli, F.; Salvador, S.; Sturaro, E. Environmental sustainability of Alpine livestock farms. *Ital. J. Anim. Sci.* 2014, 13, 3155. [CrossRef]

58. Sibelet, N.; Chamayou, L.; Newing, H.; Montes, I.G. Perceptions of Trees Outside Forests in Cattle Pastures: Land Sharing Within the Central Volcanic Talamanca Biological Corridor, Costa Rica. *Hum. Ecol.* 2017, 45, 499–511. [CrossRef]

59. Zhang, Y.; Min, Q.; Li, H.; He, L.; Zhang, C.; Yang, L. A conservation approach of globally important agricultural heritage systems (GIAHS): Improving traditional agricultural patterns and promoting scale-production. *Sustainability* 2017, 9, 295. [CrossRef]

60. Garcia, M.A.; Yague, J.L.; de Nicolas, V.L.; Diaz-Puente, J.M. Characterization of Globally Important Agricultural Heritage Systems (GIAHS) in Europe. *Sustainability* 2020, 12, 1611. [CrossRef]

61. Zhang, Y.; Min, Q.; Jiao, W.; Liu, M. Values and Conservation of Honghe Hani Rice Terraces System as a GIAHS Site. *J. Sustain. Tour.* 2016, 7, 197–204.

62. Su, M.M.; Dong, Y.Z.; Wall, G.; Sun, Y.H. A value-based analysis of the tourism use of agricultural heritage systems: Duotian Agrosystem, Jiangsu Province, China. *J. Sustain. Tour.* 2020, 28, 2136–2155. [CrossRef]

63. Kerr, R.B. Food Security in Northern Malawi: Gender, Kinship Relations and Entitlements in Historical Context. *J. S. Afr. Stud.* 2005, 31, 53–74. [CrossRef]

64. Wondie, M.; Schneider, W.; Melesse, A.M.; Teketay, D. Spatial and Temporal Land Cover Changes in the Simen Mountains National Park, a World Heritage Site in Northwestern Ethiopia. *Remote Sens.* 2011, 3, 752–766. [CrossRef]

65. Bowen, S.; Master, K.D. New rural livelihoods or museums of production? Quality food initiatives in practice. *J. Rural Stud.* 2011, 27, 73–82. [CrossRef]

66. Altieri, M.A. Linking ecologists and traditional farmers in the search for sustainable agriculture. *Front. Ecol. Environ.* 2004, 2, 35–42. [CrossRef]

67. Kroon, F.J.; Thorburn, P.; Schaffelke, B.; Whitten, S. Towards protecting the Great Barrier Reef from land-based pollution. *Glob. Chang. Biol.* 2016, 22, 1985–2002. [CrossRef]

68. Narayan, K.A.; Schleeeberger, C.; Bristow, K.L. Modelling seawater intrusion in the Burdekin Delta Irrigation Area, NorthQueensland, Australia. *Agric. Water Manag.* 2007, 89, 217–228. [CrossRef]

69. Ohe, Y.; Kurihara, S. Evaluating the complementary relationship between local brand farm products and rural tourism: Evidence from Japan. *Tour. Manag.* 2013, 35, 278–283. [CrossRef]

70. Hashimoto, S.; Nakamura, S.; Saito, O.; Kohsaka, R.; Kamiyama, C.; Tomiyoshi, M.; Kishioka, T. Mapping and characterizing ecosystem services of social–ecological production landscapes: Case study of Noto, Japan. *Sustain. Sci.* 2015, 10, 257–273. [CrossRef]

71. Miyake, Y.; Uchiyama, Y.; Fujiyama, Y.; Kohsaka, R. Towards Evidence Based Policy Making in GIAHS: Convention Theory and Effects of GIAHS Registration on the Wholesale and Retail Trade of Traditional and Local Vegetables. *Sustainability* 2021, 13, 5330. [CrossRef]

72. Vinceti, B.; Termote, C.; Ikowitz, A.; Powell, B.; Kehlenbeck, K.; Hunter, D. The Contribution of Forests and Trees to Sustainable Diets. *Sustainability* 2013, 5, 4797–4824. [CrossRef]

73. Winkler, K.J.; Viers, J.H.; Nicholas, K.A. Assessing Ecosystem Services and Multifunctionality for Vineyard Systems. *Front. Environ. Sci.* 2017, 5, 3155. [CrossRef]

74. Hennenberg, K.J.; Dragisic, C.; Haya, S.; Hewson, J.; Semroc, B.; Savy, C.; Wiegmann, K.; Fehrenbach, H.; Fritsche, U.R. The Power of Bioenergy-Related Standards to Protect Biodiversity. *Conserv. Biol.* 2010, 24, 412–423. [CrossRef]

75. Pautasso, M.; Aistara, G.; Barnaud, A.; Caillon, S.; Clouvel, P. Seed exchange networks for agrobiodiversity conservation. A review. *Agron. Sustain. Dev.* 2013, 33, 151–175. [CrossRef]

76. Kandari, L.S.; Phondani, P.C.; Payal, K.C.; Rao, K.S.; Maikhuri, R.K. Ethnobotanical study towards conservation of medicinal and aromatic plants in upper catchments of Dhauli Ganga in the central Himalaya. *J. Mt. Sci.* 2012, 9, 286–296. [CrossRef]

77. Bush, R. Politics, power and poverty: Twenty years of agricultural reform and market liberalisation in Egypt. *Third World Q.* 2007, 28, 1599–1615. [CrossRef]

78. Yilmaz, O.; Ertugrul, M.; Wilson, R.T. Domestic livestock resources of Turkey. *Trop. Anim. Health Prod.* 2012, 44, 707–714. [CrossRef]

79. Gaydon, D.S.; Probert, M.E.; Buresh, R.J.; Meinke, H.; Suriadi, A.; Dobermann, A.; Bouman, B.; Timsina, J. Rice in cropping systems—Modelling transitions between flooded and non-flooded soil environments. *Eur. J. Agron.* 2012, 39, 9–24. [CrossRef]
80. Gibon, A. Managing grassland for production, the environment and the landscape. Challenges at the farm and the landscape level. *Livest. Prod. Sci.* **2005**, *96*, 11–31. [CrossRef]

81. Tudisca, S.; Sgroi, F.; Testa, R. Competitiveness and sustainability of extreme viticulture in Pantelleria Island. *New Medit* **2011**, *10*, 57–64.

82. Wang, S.; Min, Q. *Agricultural Heritage Systems and Agriculture, Peasants, Countryside*; China Environment Sciences Press: Beijing, China, 2009.