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The Significance of Traditional Culture for Agricultural Biodiversity—Experiences from GIAHS

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Abstract: Agricultural biodiversity has a high importance in social-cultural, economic, and environmental aspects, and can help in adapting to and withstanding climate change. Conserving the GIAHS sites and the important components within them can help conserve the agricultural biodiversity and traditional agricultural culture of the whole country. This study considered Ifugao Rice Terraces, Dong's Rice-Fish-Duck System, and Hani Rice Terraces System as three examples which show that traditional culture can be used to protect agricultural biodiversity, while as a carrier of traditional culture, agricultural biodiversity also conveys and protects the traditional culture of the nation. According to the analyses, through several years of efforts, the status of agricultural biodiversity and traditional culture in them has improved. Then, to further promote agricultural biodiversity conservation and traditional culture protection, several suggestions are made, such as establishing community seed banks; documenting and preserving traditional farming methods, techniques, and tools and developing participatory activities which encourage more farmers to participate in the protection work.

Key words: agricultural biodiversity; traditional culture; Globally Important Agricultural Heritage Systems (GIAHS); rice terraces; traditional variety

1 Introduction

In 2002, The Food and Agriculture Organization (FAO) put forward a global traditional agricultural protection initiative, called Globally Important Agricultural Heritage Systems (GIAHS), which aims to protect traditional agricultural systems with important values. GIAHS are outstanding landscapes of aesthetic beauty that combine agricultural biodiversity, resilient ecosystems, and a valuable cultural heritage. Located in specific sites around the world, they sustainably provide multiple goods and services, as well as food and livelihood security for millions of small-scale farmers (FAO, 2021). In the process of designating and conserving GIAHS sites, agricultural biodiversity and traditional culture are considered as extremely important contents of the GIAHS. On the one hand, the local species, varieties and breeds, and the associated traditional agricultural culture in GIAHS sites represent important elements of national agricultural biodiversity and traditional agricultural culture. Conserving the GIAHS sites and these essential components within them can help conserve the agrobiodiversity and traditional agricultural culture of the whole country. On the other hand, many GIAHS sites are also areas of ethnic minorities, where the traditional agricultural culture is the main component of local traditional culture.

Agricultural biodiversity, which has high importance in social-cultural, economic, and environmental aspects, includes all of the biological diversity components of relevance to food and agriculture and all components of biolog-

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ical diversity that constitute the agricultural ecosystems (CBD, 2018a). It provides not only food and income but also raw materials for clothing, shelter, medicines, new breeding varieties, and performs other services such as maintenance of soil fertility and biota, as well as soil and water conservation, all of which are essential to human survival (CBD, 2018b). In several areas of the world and across various religions, some agricultural species are part of the local people's spiritual beliefs. These species have special meanings and/or perform essential roles in people's lives (Min and Zhang, 2008; Lei et al., 2009). Also, some studies have shown that rich agrobiodiversity is essential for ensuring food security (Caiji and Xue, 2016; Yang et al., 2017). Therefore, developing ways to conserve agrobiodiversity is an important topic for researchers in ecology, resource management and agriculture. However, under the influence of global climate change, agricultural biodiversity conservation faces severe challenges (Yin, 2013). Since 2009 when 244 million people were affected by climate change, the number has continued to rise, and there has been a significant increase in climate-related disasters worldwide (UNISDR, 2015; Yang et al., 2017). Especially in agricultural areas, farmers whose primary economic source is agriculture are particularly susceptible to climate change. Crop yields, varieties, and planting systems have all been negatively affected by climate change. Varieties with high adaptability and resistance to climate change are needed to ensure the economic income of farmers and maintain the stability of the agro-ecosystem. A number of studies have shown that with long-term natural and artificial selection pressures, such as climate, soil types, and many other factors, traditional varieties have excellent resistance to the climate and soil state changes that are caused by climate change, such as cold and drought (Yang, 2015). Therefore, these traditional varieties play an important role in crop breeding, and in specific areas, they are more adaptable to local conditions and have higher resistance (Lei et al., 2009; Zhang et al., 2011). At the same time, some studies have shown that traditional agricultural ways, which conserve agricultural diversity, are part of the traditional cultures (Lei et al., 2009; Caiji and Xue, 2016). As for traditional varieties, there are usually many related traditions, special skills and methods for planting them. This knowledge is an important part of the local culture. Population growth determines the increase in food demand, and many farmers choose to plant modern varieties and use modern agricultural practices to increase production levels. Under this trend, many traditional varieties are disappearing, and agricultural genetic diversity is being reduced. When these traditional varieties disappear, the related traditional knowledge, skills, culture, and other things also disappear with them (Zhang et al., 2011). By protecting traditional agricultural practices and traditional knowledge, traditional agricultural varieties and agrobiodiversity can be conserved, and food security can also be ensured. As the traditional culture is closely linked to agrobiodiversity, and both of them perform important roles in people's daily lives, figuring out how to effectively protect them is an important issue for scholarly research.

Thus, we established a conceptual framework to define the agricultural biodiversity and traditional culture in GIAHS and selected three typical GIAHS sites (Ifugao Rice Terraces, Dong's Rice-Fish-Duck System, and Hani Rice Terraces System) to analyze the interrelationships between agricultural biodiversity and traditional culture in GIAHS sites. Based on the results, we propose several specific policy suggestions related to promoting agricultural development through agricultural biodiversity utilization while at the same time benefiting the local people.

2 Methods

2.1 Conceptual framework

In order to identify the positive significance of traditional culture to agricultural biodiversity, we established a conceptual framework of the interrelationship between agricultural biodiversity and traditional culture in this paper to define the basic elements of agricultural biodiversity and traditional culture specifically in GIAHS (Fig. 1).

In terms of agricultural biodiversity, the most fundamental element is the traditional varieties of core agricultural products in GIAHS. Simultaneously, the diversity of food and non-food products that share the security of food and livelihoods with the core agricultural products is also an essential manifestation of agricultural biodiversity. 1) The core agricultural products are the most representative agricultural products in GIAHS sites, such as rice in the Hani Rice Terraces System. Among the core agricultural products, traditional varieties have fundamental ecological, economic, and cultural values. 2) In addition to the core agricultural products, other agricultural products in GIAHS sites that can be used for food, fertilizer, energy, and other purposes, especially the traditional varieties of these agricultural products, are also an important part of agricultural biodiversity.

In terms of traditional culture in GIAHS, the essential elements include food culture, traditional festivals and religion, and traditional farming methods. 1) Food culture constitutes one of the most critical aspects of traditional culture. Diversified food from agrobiodiversity is a crucial way for the inhabitants of GIAHS sites to use their agricultural resources, as well as a significant factor in stressing the importance of the agricultural ecosystems and agrobiodiversity, which are the sources of such wealth. 2) Most agricultural species have fixed growth rhythms. So, during the long-term cultivation, the growth calendar of these varieties has also become a calendar for farmers in the GIAHS sites to engage in agricultural life, and these local farming activities have close relationships with their traditional festivals, religion,

and culture. 3) Traditional farming methods are also an essential part of traditional culture and of great significance for conserving agricultural biodiversity, especially genetic diversity (Wang, 2015). In areas like GIAHS sites where traditional culture is well preserved, many residents continue using traditional farming methods because of cultural reasons and because these methods have been successful for centuries. 4) The impact of traditional culture on agricultural biodiversity could also be reflected through social relations, especially labor relations. In the agricultural heritage sites, various farmers will exchange their crops as well as their experience and knowledge in farming to maintain their friendships during the farming process.

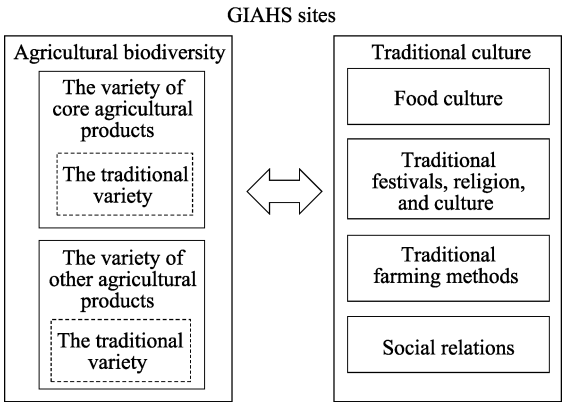

Fig. 1 The conceptual framework of the interrelationship between agricultural biodiversity and traditional culture in GIAHS

2.2 The cases of GIAHS sites

To analyze the interrelationship between agricultural biodiversity and traditional culture, we selected Ifugao Rice Terraces, Dong's Rice-Fish-Duck System, and Hani Rice Terraces System as the cases. These three GIAHS sites are dominated by mountain rice terraces and were designated as GIAHS sites at almost the same time (Table 1). In these three sites, across many years of distinctive agricultural activities, the residents of these systems not only planted and protected many traditional agricultural varieties but also accumulated rich traditional knowledge and traditional culture as well. Their indigenous agricultural technologies, selection of the settlement sites, and traditional customs for environmental protection and conservation all show a harmonious relationship between humans and nature and their relationship in human society. Apart from the rich agrobiodiversity, these systems also provide multifunctional goods and services and consist of the prominent agricultural culture.

However, because of the growth of regional economic development demand, as well as many environmental factor changes, these systems have experienced varying degrees of degradation and destruction. The agrobiodiversity, unique traditional culture, and agricultural practices in them have faced a great crisis. There is an urgent need to research how to effectively protect them and to understand the relationship between agricultural diversity conservation and traditional culture protection.

Table 1 Basic information of the study areas

GIAHS site	Ifugao Rice Terraces	Dong's Rice-Fish-Duck System	Hani Rice Terraces System
Location	Central Cordillera Region, Northern Philippines	Congjiang County, Guizhou Province, China	Honghe Hani and Yi Autonomous Prefecture, Yunnan Province, China
Basic features	The system is considered as evolved living cultural landscapes, which were painstakingly 'carved' on hill and mountain slopes by the ancient Ifugaos (Acabado, 2012). It was designated as a GIAHS site in 2011 and as UNESCO World Heritage Sites in 1996	The system consists of a unique ecological symbiosis, which means fish provide fertilizer to rice, regulate micro-climatic conditions, soften the soil, disturb the water, and eat larvae and weeds in the flooded fields; while rice offers shade and food for the fish. It was designated as a GIAHS site in 2011	This system forms a unique landscape: Hani villages are built on the mountain sides, above the village are the flourishing forests, and the terraces are just below the villages. It was designated as a GIAHS site in 2010

3 Results

The significance of traditional culture and indigenous knowledge for biodiversity conservation and natural resource management has been widely recognized around the world (Douglas and Agus, 2012; Yuan et al., 2014; Ren et al., 2018). In GIAHS sites, the traditional culture is closely linked to agrobiodiversity. Based on local traditional culture and long-term adaptations to the natural environment, the inhabitants of the agricultural cultural heritage sites have shaped unique and ingenious agricultural practices which are adapted to local conditions. These traditional farming practices, which are still in use, and the associated local cultures have played (and still play) important roles in agrobiodiversity conservation (Liu et al., 2010; Yang et al., 2019). For example, the planting area of red rice in Hani Terraced field system accounts for 12.54%, and the number of farmers planting red rice accounts for 23.33%, which is higher than the planting area of red rice and the proportion of farmers in the surrounding areas (Yang et al., 2017). In addition, the rich rice varieties in Yunnan are mainly concentrated in the southern part where the heritage systems such as Hani Rice Terraces and Pu'er Traditional Tea Agrosystem are distributed, while the rice varieties in the northern part are relatively limited (Feng et al., 2010). The process of the development and preservation of traditional culture also maintains and promotes the cultivation and utilization of traditional crop varieties. Meanwhile, during the phases of traditional culture changes, agrobiodiversity changes as well.

Agricultural biodiversity not only provides the basic material necessary for survival, but is also closely related to the formation and development of traditional culture. In GIAHS sites, it plays an active role in the food culture, daily life and special activities of the local people, such as their traditional festivals. The rich and unique traditional culture within the system runs through the whole process from seed selection, cultivation, and harvesting to the production of agricultural products. Many traditional varieties are not only a simple food crop for the communities of the GIAHS sites but also the essence of the cultural value of the local ethnic groups (Wang, 2015). Some studies have shown that rich agricultural biodiversity can help maintain the traditional culture in GIAHS sites. The continuous cultivation of traditional crop varieties such as rice can protect the cultural customs of the local ethnic groups and extended the fine traditions inherited from their ancestors.

3.1 Food culture conserves agrobiodiversity while being inherited

During the living history of the GIAHS site residents, they have formed their unique eating customs and food preferences, which constitute their food culture. Besides, the eating customs and edible materials people choose reflect their traditional culture, lifestyles and living attitudes. One of the ways traditional culture can support the conservation of agrobiodiversity is through food culture in the form of dietary preferences and traditional dishes (Fig. 2).

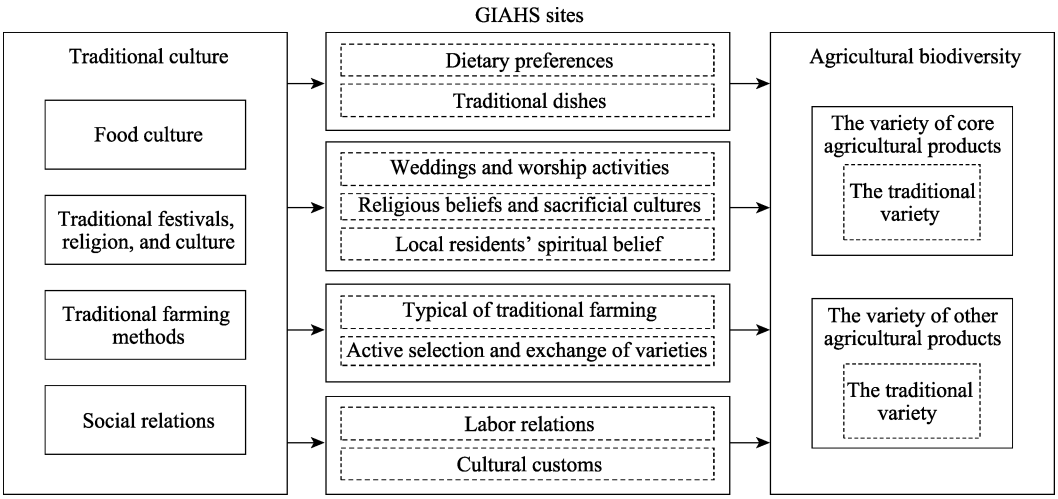

Fig. 2 The positive significance of traditional culture to agricultural biodiversity in GIAHS

Under the influence of food culture, the communities of GIAHS sites have developed the habit of eating specific agricultural varieties. These varieties are usually traditional varieties which are often the product of agricultural species adapting to the natural environment. Traditional varieties usually show high adaptability and resistance, but with the development of modern agriculture, many traditional varieties face the risk of being replaced by modern varieties. In this situation, in order to satisfy their food preferences, the residents often chose to continue to grow the traditional varieties, usually for self-consumption, together with the modern ones used as cash crops. This is one way in which the traditional varieties and agrobiodiversity can be conserved. This conservation phenomenon is present in all three of the study sites. For example, the people from Hani Rice Terraces System continue growing red rice for cultural reasons, residents of Dong's Rice-Fish-Duck System have a preference for an indigenous carp called paddy field carps (*Cyprinus carpio*), and residents of Ifugao Rice Terraces consume "Tinawon" and "Diket/dayakkot" rice for special events (Joshi et al., 2000; Wu and Zou, 2014; Wang et al., 2017). Although the crop varieties in the GIAHS sites have changed, these traditional varieties are still conserved and cultivated due to cultural reasons.

Another way of conserving agrobiodiversity through food culture is through traditional dishes. Traditional dishes are often made from some unique agricultural species. These dishes, which represent the culture and beliefs of local residents, usually have a long history and are an important link to the identity of the rural communities. The continuous use of traditional varieties for the preparation of traditional dishes is the only way these species and varieties can be conserved. The residents of Hani Rice Terraces System prefer to eat traditional dishes like "Nuomibaba" and "Xinmijiu" (a handcrafted wine made from fresh rice and often used to celebrate harvest, marriage, and other special occasions) while the Rice-Fish Culture's residents like to eat "braised field fish". Because of these dishes, many traditional agricultural varieties like "Manchenuo" (an indigenous rice variety in Hani Rice Terraces) are conserved (Wang, 2015; Jiang, 2016; Zhang, 2016).

Along with conserving agricultural biodiversity, food culture is based on food and dependent on food. The existence of the corresponding agricultural species as food raw

materials plays a decisive role in whether the food culture attached to it can be conserved. In GIAHS sites, during the process of using local crops to make traditional dishes, the corresponding food culture is also promoted and inherited. On the contrary, when the agricultural biodiversity decreases, many traditional varieties will disappear and many traditional dishes will no longer being made, and then the related food culture will also dissipate because it has lost its material basis. In the past, there were many traditional dishes made of red rice and other local agricultural varieties, and the food culture was rich in Hani Rice Terraces. But over the past three decades, with the reduction of the traditional crop varieties, the unique Hani food culture has suffered a great negative impact (Wang et al., 2019).

3.2 Traditional festivals and religion can maintain agrobiodiversity

When the agrobiodiversity decreases, the cultivated varieties will change, the related farming activities and the timing of those activities will also change, which will have a negative impact on local traditional festivals. The Fresh Rice-tasting Festival is a traditional and unique festival in Hani Rice Terraces System, but nowadays, owing to changes in the cultivated varieties, the local farming calendar has changed and many farmers no longer celebrate this festival. On the other hand, in some GIAHS sites, many residents still believe in their traditional religions, and in many of those religions, agricultural species play an important role and help to maintain the religion. For example, the rituals of the traditional religion in Ifugao Rice Terraces were categorized into 37 types, and 17 of them are related to the production and consumption of traditional varieties (Fig. 2).

Over the centuries the communities of GIAHS sites have accumulated numerous unique customs, festivals and cultural activities. During traditional festivals, weddings and worship activities specific species and varieties are often used. Because of this, those species are conserved and made available for people to cultivate and use. The process of the development and continuation of traditional cultural practices, which vary according to the ethnic groups, maintains and promotes the cultivation and utilization of many traditional crop varieties and represents an important avenue for the conservation of agrobiodiversity.

In the process of adapting to the natural environment, residents of GIAHS sites have created various religious beliefs and sacrificial cultures, including the belief in Buddhism, heaven and earth, ancestors, national heroes, deity mountain forests, etc. These rituals and beliefs require some agricultural species to practice the worship of their ancestors and nature. In Hani Rice Terraces System, people use some traditional varieties of glutinous rice such as “Changmang nuo” to worship the deity tree (Wang, 2015). In Ifugao Rice Terraces, farmers believe that if their family gets sick, a possible reason is that a deceased relative’s spirit is not pleased and to worship the dead relative they use rice and cock with many other traditional agricultural species.

In addition to the above-mentioned ways, there are some other manifestations of traditional culture that have an effect on the protection of agricultural biodiversity. One of those is through local residents’ spiritual beliefs. Under the influence of worship of the mountain forest deity, the residents of Hani Rice Terraces System protect the forest incidentally and the original natural environment is conserved. Therefore, because many wild crop varieties are found in the sacred forests, the agricultural genetic biodiversity has also been conserved (Lv, 2018). At the same time, as the sacred mountain forests have been conserved for a long time, and the ancient trees are the key species of this ecosystem, when those trees are carefully conserved, the ecosystem and agricultural species in it are also conserved. In addition, the straw of some traditional rice varieties can be used to feed livestock, build mushroom houses, make brooms and for other purposes. These uses are an important part of the traditional life which is conserved by traditional culture. Preservation of the traditional rice varieties by farmers for thousands of years is a consequence of their continuous use by the indigenous communities. In Ifugao Rice Terraces, “Muyong”, forest or woodlot in the local dialect, plays a significant role in the traditional culture. According to the research, the way the “Muyong” system is managed significantly reduces the erosion of terraced arable land, improves the stability of cultivated land, and thus improves agricultural biodiversity. What’s more, studies show that cultural factors and traditional knowledge have a positive correlation with the diversity of native rice species, including the traditional rice planting area ratio, seed treatments, seed acquisition mechanisms and the selection basis.

3.3 Traditional farming methods conserve agrobiodiversity while they are maintained

The ingenuity behind the traditional farming methods has shaped the landscape and created diverse land patches for different uses. This diversified structure of the landscape sustains a rich biological diversity. In these systems, the use of chemical herbicides and pesticides is low creating a more stable ecosystem which can sustain agricultural biodiversity (Bai et al., 2012).

The use of specific farming patterns, typical of traditional farming, is a way to conserve agrobiodiversity (Fig. 2). Many farmers of Dong’s Rice-Fish-Duck System choose to raise carps of different colors at the same time, which helps to conserve a wide range of genetic resources in the rice fields and increase fish production while improving resource use (Ren et al., 2018). The traditional farming method used by the farmers in Hani Rice Terraces System of raising fish in terraced fields extends the food chain and improves the agricultural biodiversity within the system (Huang and Yuan, 2011; Sun, 2012). These traditional prac-

tices improve farmers' income, by diversifying income sources, which, in return, encourages farmers to continue these practices. In addition, farmers of Hani Rice Terraces System prefer to use a local breed of buffalo rather than agricultural machinery to plow the terraced fields and they have found that by cultivating hybrid rice, the yield of rice stalks cannot meet the feed consumption needs of the buffalos. Because of this inadequate feed supply, not only is the local breed of buffalo preserved but the traditional rice varieties are also preserved, demonstrating the positive interactions between different locally adapted species.

In addition, in GIAHS sites, traditional farming methods closely related to traditional varieties are not only one of the most important parts of the system but also an important part of the traditional culture within the system. The main reason why many traditional farming methods still exist and are being used by local farmers is the continuous planting and utilization of specific agricultural species and varieties. On the other hand, when one system has rich agricultural biodiversity and local farmers still cultivate many traditional varieties, they will be more likely to continue the traditional farming activities and follow the same agricultural activity calendar. Thus, the time that all the local residents sow, weed and harvest the crop is usually the same for everyone, which gives them more opportunities to share and communicate the relevant knowledge and skills. This interaction is important for maintaining the local traditional agricultural culture. At the same time, the situation that most farmers follow the same agricultural activity calendar can help local governments and leaders of the community manage the agricultural activities in the community, which is useful for helping the community to remain stable.

3.4 Social relations, especially labor relations, can protect agrobiodiversity

The impact of traditional culture on agricultural biodiversity can also be reflected through social relations, especially labor relations (Fig. 2). In the agricultural heritage sites, after a long period of mutual adaptation with the natural environment, people have formed very close and special labor relationships. In the process of farming, different farmers will exchange their crops as well as their experiences and knowledge in farming to maintain their friendships. For example, in Hani Rice Terraces System, during the farming period, each farmer will retain several varieties of red rice and glutinous rice with the aim of selectively growing different rice varieties according to different climatic and soil conditions. Also, the farmers of Hani Rice Terraces System usually exchange their traditional rice varieties with their neighbors and change the varieties they cultivate every few years (Wang, 2015). Studies show that these behaviors promote the spread of traditional varieties, enhance the adaptability and diversity of the planted rice, prevent the degradation of rice varieties and sometimes even lead to the breeding of varieties with special qualities (Vargas-Ponce et al., 2009; Gyawali et al., 2010; Bajracharya et al., 2012).

Another way to show the positive effect of social relations on agrobiodiversity is through the cultural customs (Fig. 2). In these GIAHS sites, under the influence of the traditional culture, agriculture has a higher social status and agricultural species mean a lot to the local farmers. When they host some special activities, such as weddings or funerals, they like to bring some traditional varieties as a gift owing to cultural and social factors (Xu et al., 2010; Wang, 2015). In this way, the local varieties are conserved. In Ifugao Rice Terraces, agricultural species like rice, pigs, and cows are used as gifts during the whole process of marriage. Three pigs of different sizes are sacrificed when the husband's parents meet the wife's family, rice cakes made of a traditional rice variety and coconut milk are used for the engagement, and the skeleton of a carabao, or water buffalo, is put up in the rich family's house as a decoration during wedding days.

4 Discussion

As stated above, traditional culture can be used to protect agricultural biodiversity, while as a carrier of traditional culture, agricultural biodiversity also conveys and protects the traditional culture of the nation. There is a mutual promotional trend between agricultural biodiversity conservation and traditional culture protection. According to the analyses in this paper, through several years of efforts, although the status of the agrobiodiversity and traditional culture in these three GIAHS sites has improved, some problems still remain. Therefore, to promote agricultural biodiversity conservation and traditional culture protection, as well as effectively improve the conservation of GIAHS sites, the following suggestions are proposed.

(1) Establishing community seed banks, and enhancing social network. A community seed bank is a way to protect agricultural biodiversity resources which combines ectopic protection with farmer protection (Vernooy et al., 2014). Establishing community seed banks and social networks can not only conserve existing traditional varieties, but also give farmers more chances to obtain and exchange traditional varieties and conserve the related culture as well. For example, 75%–100% of seeds are exchanged within the community by farmers in Aguitia Valley, Peru (Wang, 2011). Based on our investigation and some in-depth research, there used to be many local and traditional agricultural varieties in the study sites. However, due to the lack of effective protection over time, many varieties have disappeared (Wang, 2015). Meanwhile, the farming communities could not easily collect and exchange their agricultural varieties, and due to the low utilization, those varieties face a big crisis. Hence, establishing community seed banks, and enhancing social networks are important ways to conserve agrobiodiversity.

(2) Documenting and preserving traditional farming methods, techniques and tools. Traditional methods, farming techniques and tools, which are all important parts of traditional culture, show an important influence on cultivating, using and then conserving the traditional agricultural varieties (Yuan and Gu, 2016; Wang et al., 2019). Thus, documenting and preserving them could effectively protect the traditional culture and agricultural biodiversity at the same time.

(3) Recording and protecting traditional knowledge, especially women's knowledge. There is a close relationship between traditional knowledge and traditional culture, and the effective retention of traditional knowledge is of great significance to the inheritance of traditional culture (Ha, 2020). Meanwhile, an important part of traditional knowledge of agriculture heritage systems is the traditional knowledge of biodiversity conservation (He, 2020). According to the investigation and some published literature, women play an important role in agricultural activities and traditional culture inheritance. Their knowledge is an important and indispensable component of traditional knowledge as well as traditional culture (Caballero-Serrano et al., 2019). Based on this, recording and protecting the traditional knowledge represented by women's knowledge plays an important role in protecting agricultural biodiversity and traditional culture.

(4) Developing heritage tourism appropriately. The protection of GIAHS should be a form of dynamic conservation. Tourism is an important measure for the development and protection of heritage sites (Dallen, 2014). Tourism can increase the visibility of the heritage site as well as attract more attention from organizations and researchers, which could help to conserve the heritage systems and the traditional culture, as well as the agricultural biodiversity found inside (Sun, 2012). Additionally, protecting and developing traditional culture at the same time is one of the main ways to maintain better preservation when facing the impacts of modern culture. In addition, sustainable tourism can increase the income of heritage communities by providing more jobs, increasing the value of agricultural products and many other aspects (Dong and Ding, 2019). As an additional benefit, the increased employment and income of local farmers can boost their enthusiasm for conserving the heritage systems and traditional culture as well as the agrobiodiversity in it.

(5) Developing participatory activities and encouraging more farmers to participate in the protection work. Farmers are the creators of the heritage, the main force of conservation, also the beneficiaries of conservation (He et al., 2020). The farmers of GIAHS are the main force of the traditional culture protection and agricultural biodiversity conservation. Their awareness of the importance of the system and its culture and diversity has an important impact on the conservation efforts (Zhou, 2015). Therefore, through promotional activities, the locals will learn more about the importance of the GIAHS, traditional culture, and agrobiodiversity, and their sense of honor and responsibility for conserving the GIAHS as well as the traditional culture and agricultural biodiversity can be improved. They will have a greater willingness to participate in conservation activities such as maintaining traditional culture, cultivating and protecting traditional varieties, etc. At the same time, local farmers are the people who know the system best, so by calling on residents to participate in the protection work and enabling farmers to participate in the formulation and implementation of local policies, those policies will be more suitable and effective for the regional situation.

(6) Enhancing cultural confidence and the sense of belonging. Against the background of modern culture, the protection of traditional culture is faced with a great impact, and this impact is inevitable. In view of this, it is necessary to enhance the cultural confidence and sense of belonging among the people inside the heritage sites. Let them protect and inherit the traditional culture of the region on the basis of a full understanding of it. In this way, the traditional culture can be firmly rooted in people's hearts, and its vitality will continue with population growth.

5 Conclusions

In this paper, we established a conceptual framework of the interrelationship between agricultural biodiversity and traditional culture in GIAHS, and selected three GIAHS sites that are dominated by mountain rice terraces as the case studies. The experiences of these three typical GIAHS sites show that traditional culture has a significant positive effect on agricultural biodiversity. Firstly, food culture conserves agrobiodiversity while being inherited. Secondly, agrobiodiversity helps to maintain traditional festivals and religion while being conserved. Thirdly, traditional farming methods conserve agrobiodiversity while being maintained. However, some problems still exist in many GIAHS sites. Thus, we proposed some suggestions to improve the conservation of GIAHS sites from the perspective of agricultural biodiversity and traditional culture. In particular, 1) Establish community seed banks and enhance social networks; 2) Document and preserve traditional farming methods, techniques, and tools; 3) Record and protect traditional knowledge, especially women's knowledge; 4) Develop heritage tourism appropriately; 5) Develop participatory activities and encourage more farmers to participate in the protection work; and 6) Enhance cultural confidence and the sense of belonging.

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传统文化对农业生物多样性保护的积极意义：基于全球重要农业文化遗产的视角

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摘　要：农业生物多样性不仅在社会文化、经济和环境等方面体现出高度重要性，同时有助于适应和抵御气候变化。全球重要农业文化遗产（GIAHS）的保护有助于促进所在区域的农业生物多样性和传统农业文化的保护。本研究以三处典型的 GIAHS 为例：贵州从江侗乡稻鱼鸭系统、云南红河哈尼稻作梯田系统及菲律宾伊富高梯田系统，实证探究了传统文化对农业生物多样性保护的积极意义，即传统文化可以用来保护农业生物多样性，而农业生物多样性作为传统文化的载体，也可以用来传达和保护民族传统文化。在此基础上，为进一步推进农业生物多样性保护和传统文化保护，应当建立社区种子库，记录和保存传统耕作方法、技术和工具，开展参与性活动，并且鼓励更多农民参与农业文化遗产保护工作。

关键词：农业生物多样性；传统文化；全球重要农业文化遗产(GIAHS)；稻作梯田；传统品种