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Human and Non-human Networks in Baihualing: A Case Study of the Birdwatching Industry

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Abstract

This paper uses Actor-Network Theory (ANT) to analyze how human and non-human stakeholders directly and indirectly involved in Baihualing birdwatching industry jointly contribute the local economic and ecological network. The research is based on a fieldwork carried out in the summer of 2025 in Baoshan, Yunnan, adopting a combination of participant observation and semi-structured interviews. The initial intention was to discuss uncivilized behaviors during birdwatching, such as bird baiting, and their effects on the environment. However, the results of fieldwork reveal the dynamic balance between bird protection and ecotourism development with villagers' voluntary rules establishment, profit allocation and ecological management. The findings also highlight how Baihualing birdwatching industry boost villagers' income, while promoting ecological protection. In the future, Baihualing should continuously pay attention to maintaining this balance and preventing overdevelopment.

Keywords: ecotourism, birdwatching, citizen science

1. Introduction

1.1 Birdwatching History and Development

Birdwatching is primarily a personal pleasure and satisfaction activity, where birdwatchers often strive to see and photograph as many bird species as possible [1]. It was first developed in Western countries like those in Europe and North America.

Birdwatching was first introduced in the late 1980s by foreigners who visited China to watch birds [1], and it has been continuously expanding in China. Taiwan formed the earliest birdwatching societies under the influence of the US and Japan, whereas Hong Kong developed birdwatching communities with the culture introduced by British enthusiasts [2]. According to Dr. Zhu, a famous science writer and senior member of Xiamen Birdwatching community, the recreational birdwatching activities were then spread to China mainland with Beijing, Shanghai, Fuzhou, Xiamen and Shenzhen being the earliest cities having amateur birdwatchers. Later, the total number of bird-watchers has increased dramatically since the 21st century. Starting with only 600 people in 2000, the figure grew to 20,000 in 2010 [3]. They took pictures of birds and shared them on platforms or forums, such as eBird and the World Wildlife Fund forum.

Besides birdwatching as entertainment, there was increasing civic awareness on non-economic issues, especially environmental problems, in China as it progressed to a post-material society [1]. Thus, many birdwatchers began to get involved in citizen science, where non-professionals could contribute to scientific research just like experts. For example, bird watchers contributed 38% (8/21) of the bird species in China's national checklist, and nearly 70% of bird-watching communities have submitted bird conservation proposals to local governments [3]. The scientific achievements then pay back with deeper and more committed interests in birdwatching among bird lovers, forming a virtuous cycle.

1.2 Bird Baiting

Despite the benefits, the increased recreational birdwatching also brought additional environmental issues, and a main one is "bird baiting". Bird baiting, in the context of birdwatching, refers to the act of luring birds, such as playing bird sounds or providing food, to intentionally disturb birds or their habitats to take photographs for aesthetic purposes or better watch them. However, this definition of bird baiting is not widely discussed in research works compared to another definition regarding adding bird repellents to baits in order to control their diets and prevent them from eating crops [4].

This lack of birdwatching and bird baiting discussion may be attributed to the nature of birdwatching, which is built on citizen science. Amateur birdwatchers are the main consumers of bird baiting, who are unlikely to be involved in academic research. Thus, there is a lack of academic focus for such topics. This paper will shed light on a case study where bird baiting acts as a catalyst to boost the birdwatching-based economy in the village.

1.3 Baihualing Birdwatching

Baihualing is a village in Yunnan province, China. According to Zhige Bao, the director of Baihualing's largest inn and bird pond, before birdwatching was spread here, villagers hunted for a living. People not only knew the twittering of different bird species, but they had also tasted them. Then some foreign bird lovers travelled there for birdwatching and randomly paid local villagers to bring them to find birds. Villagers accidentally found this business opportunity and began developing birdwatching tourism.

They began building bird ponds and became the first place to build bird ponds in China. Bird pond is a design with a combination of bird baiting and bird hide. Villagers found relatively plain areas on territories with personal forest rights and set up human made ponds and branches with fruits to attract birds. Several meters away from the attractive designs, a bird hide would be set for birdwatchers and photographers to sit and hide themselves. Tourists needed to book and pay for the seats, which granted bird pond owners some income.

Along with bird ponds, birdwatchers would live and eat in the village. This boosted the economy of inns and restaurants. Gradually, as competition progressed, the birdwatching industry began to mature and developed to what Baihualing is like now – an economy based around birdwatching and ecotourism.

1.4 Literature Review

Human stakeholders and non-human factors jointly contribute to an environment. Descola [5] described the division of human and non-human factors as the division of nature-culture, for which he criticized as the Western naturalism. And instead, he proposed that the division was blurring, supported by the cases in Ecuador and Peru, and human and non-human factors were interconnected. Additionally, Kohn [6] proposed the concept of "ecology of selves". It reveals how all factors, not only human but also non-human, all interpret and act to form the current world. For example, in Amazon, fruiting periods of trees imply food availability, which in turn reflect foraging movements of animals for humans. Similarly, Hathaway [7] did a case study on Yunnan, China. He came up with the idea of "environmental winds". He emphasized the unpredictable nature of environmental movements, which were complexly formed by local actors, including scientists, villagers and even wildlife. This paper will further support this idea by presenting the case study in Baihualing using Actor-Network-Theory (ANT), where human and non-human factors interact and contribute to form the current complex ecological environment and economy. Instead of the traditional binary opposition, humans and nature coexist and codependent on each other for collective development.

2. Methodology

2.1 Overview

This paper combines participant observation and semi-structured interviews. Data collection took place through an offline 5-day fieldwork in Baihualing at the end of July 2025. The author experienced the birdwatching process as a tourist and communicated with other tourists. This gave a true picture of birdwatchers' performance and the experience of birdwatching service in Baihualing. Later, interviews of villagers of different occupations are conducted to get a full picture of different aspects, adding validity and reliability to the results of the study. Interviewees and observees cover all main occupations in Baihualing, and each villager usually takes on several different jobs to sustain a living and support for family.

2.2 Stakeholders Introduction

2.2.1 Human Stakeholders

Occupations in Baihualing could be allocated into birdwatching related and non-birdwatching related. Since birds are only frequently seen in winter, which is seen as the boom season, and require feeding and maintenance all year long to ensure popularity of bird ponds, the income gained is limited, so bird pond owners usually have other occupations to sustain a living. And villagers usually take on various occupations.

Regarding birdwatching related occupations, villagers take on innkeepers, bird pond owners and wildlife photography bird guides. Non-birdwatching related ones include research technicians, foresters and farmers.

Besides villagers, birdwatchers also act as stakeholders. They were tourists travelling to Baihualing to watch birds. Their stay could vary from several days to a month, depending on their aim for the trip. Baozhi Ge mentioned that

experienced birdwatchers aiming for rarer species tend to stay for longer time. Their behaviors in Baihualing, especially in bird ponds, could affect the environment and the birds.

2.2.2 Non-Human Stakeholders

Good natural environment is the base for developing birdwatching industry, so the non-human factors, including the environment and animals, are significant contributors. These includes birds, insects, forests and etc.

Each stakeholder's contribution would be explained in more details in the follow part, including the basic introduction and how it contributes to the current Baihualing ecological and economic environment.

3. Stakeholders Contribution

3.1 Birdwatching Industry Stakeholders

3.1.1 Bird Pond Owner

Tiguo Hou built the first Baihualing bird pond in 2009 to provide birdwatching and photography services, charging 20 RMB for each seat per day. His success in this first try attracted other villagers to imitate, and the number of bird ponds boomed within a short time. [8] According to Baozhi Ge, Hou's son-in-law who took over the role of innkeeper and bird pond manager, the number of bird ponds once rose to over 60, but later decreased to 24 due to government's concern of their environmental threats.

3.1.1.1 Economics Contribution

Bird ponds tickets boost the economy and contribute a significant part of villagers' income. According to statistics of the Department of Natural resources of Yunnan Province [9], ticket sales to bird ponds exceeded 6100 from 2023 to 2024, generating profit of over 440 thousand RMB for the village.

However, this income may be unstable for some bird ponds due to different charging methods. Yuan's bird pond, specifically for watching Lady Amherst's pheasants, doesn't charge for daily position booking, and instead, it charges for seeing or taking photographs of the Lady Amherst's pheasants. Only when the tourists see the pheasants will they pay, and the payment is divided into two levels – seeing the pheasant charges 50 RMB and taking photos of it charges 100 RMB. This means the owner would not gain income if the tourists don't see the bird, even he spends a whole afternoon waiting with the tourists.

Despite differences across charging systems, main profit of bird ponds focuses on winters, where there lacks food for birds in nature, forcing them to forage in bird ponds. In the other slack seasons, most bird ponds lack customers and cannot make enough profit for the bird pond owners. However, the owners still need to feed the birds every day so that birds are more likely to come in boom seasons. The extra costs decrease total profit for owners and cause them to spend time on managing the bird ponds in slack seasons.

Overall, bird ponds could contribute to part of villagers' income, but its unstable charging system and variation across boom and slack seasons prevent villagers from fully rely on this as the only source of income. Thus, villagers take on other occupations to compensate the limitations.

3.1.1.2 Environmental Contribution

According to Baozhi Ge, the government and researchers often question the potential environmental threats of bird ponds as the construction would alter the initial natural environment and its potential effects on increasing birds' reliance on people's feeding or protection.

These concerns may be addressed from three main reasons. First, bird ponds could raise people's awareness to protect the environment and birds. In the past, Baihualing villagers hunted birds for a living, but as bird ponds are built, they need to protect and attract birds to manage bird ponds. Forest protection would encourage biodiversity and bring new birds to the bird ponds. Second, most bird ponds are closed in slack seasons. According to Quan Liu, a bird pond owner, only three to four bird ponds are open in summer (slack season) to minimize people's intervention on birds. Third, birds are not dependent on bird ponds for food. Around 90% of birds would switch between food from bird ponds and wild foraging from villagers' observation. Food provided by bird ponds only act as an extra source of food during food shortages in winters. Therefore, instead of harming the environment, the bird ponds are likely to have positive impacts on the birds.

There are also other effects bird ponds as a platform would have on the birds, but the nature of the effects is undetermined.

Bird ponds build close connection between bird pond owners and the birds, and the help from owners may alter bird lives. Quan Liu once found birds laying and hatching eggs on his bird pond, but only two out of four young birds survived. On the next year, he provided special care of the baby birds, and five new young birds all survived.

He helped increase the survival rate of young birds, but there were some concerns regarding the seemingly positive effect. The young birds which could not survive under natural conditions may be to too weak to live independently, so their survival may not be beneficial. This also increased population of a specific species, and if widely implemented, may lead to ecological unbalance. However, Ge Gao, the head of Forest Ranger Station, stated the effect of such small cases were limited, and there was no such imbalance along the development of bird ponds.

Additionally, some bird pond owners lack enough professional related knowledge may unintentionally harm birds. Rare birds are seen as "star birds" in bird ponds, which could attract tourists to the bird ponds for higher profits. Thus, some bird pond owners only welcome the rare birds, but repel common birds, believing common birds would eat up the food in bird ponds. They sometimes even threaten the common birds to force them leave. In fact, this also prevents rare birds from coming. According to Baozhi Ge's observation, even of different species, birds tend to come or go together, so star birds would not exist if common birds were threatened. He persuaded the owners not to repel the common birds. Though many owners accepted his suggestion, few of them still ignored his advice. Since bird ponds are built on personal area with personal forest rights, there is little others could do to intervene. The threatening may lead to birds staying away from that area for several days before they go back again, affecting birds' living and existence surrounding that bird pond.

Bird ponds also connect birds with each other and make them more concentrated to be more likely for help. A red-tailed laughingthrush had its beak broken and could not forage or eat normally. It would die in few days in the wild, but it received lots of help from other birds in the bird ponds. They fed it. This warm help helped it to live another two years.

Overall, bird ponds have impacts on the environment and the birds, but the extent of effects and their nature require further investigation to determine.

Through the development of bird ponds, there are some potential changes in bird characteristics, but further evidence still requires scientific research. From Quan Liu's observations, some migratory birds may stop migrating as becoming accustomed to bird pond environment, and the reproduction periods may change. For example, rufous-throated partridges used to reproduce once a year, but the frequency increased two twice a year – once in March and once in August – in recent years. Additionally, birds in bird ponds tend to be less sensitive for people's actions compared to wild birds according to the observation of Zhaoxian Yang, a wildlife photography bird guide. This is probably because they have more interactions with people and know people would not harm them. Some birds would even stay when the bird pond owners are adding food to containers as they are familiar with them.

3.1.2 Wildlife Photography Bird Guide

Wildlife photography is another mainstream way of birdwatching, but not as famous as bird ponds in Baihualing. A bird guide drives birdwatchers to the wild and stay where the birds are frequently seen to wait for the birds appear and take photos of the birds. Zhaoxian Yang, a wildlife bird guide who also worked as driver and research technician, mentioned that professional wildlife photography bird guides could sustain their living with only one job.

Compared to bird ponds, the backgrounds of photos taken in the wild are more realistic, which are usually blue sky from a bottom-up perspective, in contrast to the height at eyelevel of pictures shot in bird ponds. Also, the income of wildlife bird guides is less stable and constant than bird pond owners. It would vary from the place and species of birds expected by birdwatchers.

The environmental impact of wildlife birdwatching on birds is little. Bird guides would sometimes use twittering sounds to attract birds, but this baiting method is only temporary and irregular. Thus, though they may cause some birds to misjudge at certain time periods, there are no long-term effects for birds' characteristics or habits. Also, the use of twittering is often useless if birds are away from where birdwatchers are hiding.

Overall, wildlife photography bird guides can bring relatively high income for villagers and have minimal environmental impacts.

3.1.3 Inns and Restaurants

As birdwatching developed, birdwatchers needed to stay and eat in Baihualing, so Tiguo Hou first started to welcome tourists to live in spare rooms. This later developed into inns and restaurants. Up to 2024, there was 17 inns and 19 restaurants in Baihualing, and signs for publication were everywhere in the village. [9] Hou's inn, currently organized by Baozhi Ge, is the largest one and the only one to hold large size tours. Apart from birdwatching clients, tourists going hiking and hot spring on Gaoligong mountains often choose to rest for a day or two in Baihualing, providing extra clients. This development granted villagers extra income complementary of income from bird ponds.

Additionally, inns are closely connected with bird ponds and bird guides. Innkeepers are often bird pond owners, and they would carry birdwatchers from inns to the bird ponds. Birdwatchers are likely to book positions of bird ponds owned by the innkeeper. This whole process would ensure considerable profit for the villager with double occupations.

3.1.4 Birdwatchers

During the fieldwork, three birdwatchers were being observed, so the economic contribution and environmental contribution would be mainly based on their performances and the narration of bird guides. The birdwatchers in Baihualing vary from the very young generation to older population, but they usually aim differently.

The elderly are more focused on the quality of birdwatching, such as rarity of species, according to Baozhi Ge. One birdwatcher observee Chen was 68 years old from Xi'an. He had been involved in birdwatching for over a decade, a typical example of this type of birdwatcher. He always carried his professional camera and introduced birdwatching tips to other birdwatchers, as if he was a bird guide rather than a tourist. When he saw another birdwatcher wearing a white T-shirt, he told her it was unsuitable for birdwatching as white clothes would reflect sunlight and threaten the birds. He pursued high quality photos and persisted to stay and wait for the Lady Amherst's pheasants when others were proposing to leave.

More youngsters began birdwatching as natural education and fieldwork studies spread. As Baozhi Ge observed, they tend to pay more attention to the experience of birdwatching, such as the sense of escape from real life when there is no Wi-Fi during birdwatching. Another birdwatcher observee Little A (a primary school birdwatching boy met during the trip to bird pond for Lady Amherst's pheasants on 07/29/2025) from Beijing would be even younger than this distribution. He came along with his mother and carried telephoto lens, but not as professional as Chen. As mentioned by Chen, Little A's camera would not be able for capturing birds of high quality in bird ponds.

3.1.4.1 Economic Contribution

Birdwatchers were the main source of profit for every service in the village, including inns, restaurants, bird ponds etc. Hou's bird pond and inn are the most popular, and it attracts over 10 thousand customers annually as Baozhi Ge mentioned in an conversation. Less popular ones, such as bird ponds owned by Fuxiang Yang and Quan Liu, also receive several hundred birdwatchers. Three birdwatcher observees all decided to stay for around a week, which was the average of most birdwatchers.

3.1.4.2 Environmental Contribution

According to Baozhi Ge, the elderly were more likely to perform uncivilized behaviors which probably harmed birds in bird ponds, but the cases reduced significantly in recent years. They sometimes threatened birds when they did not see the species they expected, or cut off some branches to shoot for clearer pictures. Around seven or eight years ago, an old man once threatened the birds and caused all birds not going to the bird pond for many days. Bird pond owners could do nothing but persuade them by saying rare birds would not come if the common ones were threatened. Though it was usually effective, some birdwatchers would continue those behaviors, and even argued with the bird pond owners. However, villagers also recognized a drop in such uncivilized behaviors recently.

During the three-hour waiting of Lady Amherst's pheasants, Little A and his mother were always sitting patiently and sometimes raised up their telescopes to see whether there were birds coming. However, Chen was different. He once took out a lighter and boasted his deliberation to buy quiet lighter for birdwatching. He ignored the sign marking "no fire" in the bird pond, and the bird pond owner Yuan did not stop him. Though his action did not lead to any severe consequences this time, it reflected how carelessness some birdwatchers, even as experienced as Chen, could be, and the lack of disciplines for the uncivilized actions.

Overall, birdwatchers contributed to the main source of profit, but their uncivilized actions may cause potential harm or impact on the birds.

3.1.5 Stakeholders as Citizen Science Contributors

Jobin et. al. [10] emphasized the importance of grassroots and lay knowledge and how it could reshape conservation strategies. He showed the example of Taiwan, where many official statistics were collected with the help of citizens' observations. The similar concept is reflected in Baihualing where villagers' knowledge forms the base for birdwatching and environmental protection, while building on more advanced academics.

Examples of stakeholders in birdwatching industry reveals how citizen science acts as an important part in birdwatching and its development. Focusing on academics, the participants, including bird pond owners, bird guides and birdwatchers, may not be as professional as specialists who delve into the field for research, but their contributions may be equally important by providing another perspective. Though some villagers do not receive

advanced education, they possess abundant information about birds. For example, Quan Liu's education experience stopped at junior high school, but he could explain characteristics of birds in details and work as a research technician to identify birds for research teams.

The daily engagement of bird pond owners and bird guides with birds allow them to receive first-hand information. Before "A Field Guide to the Birds of China" was first introduced to the villagers, they named the birds based on their observations. For example, they called rufous-throated partridge as "Shui Lao Wa" which pronounced like crows in Chinese because they found their appearance similar to crows. According to Quan Liu, the villagers already knew the characteristics of the birds before reading the book, and the book just helped with linking the birds to their scientific names. They learnt from observation, developed the knowledge further through academic work and brought the knowledge back to practice and tracked latest changes of the birds for research. They cycle goes on, highlighting the importance of citizen science.

3.2 Non-Birdwatching Industry Stakeholders

3.2.1 Forester

Foresters are mainly responsible for protecting forests and identifying uncivilized behaviors harming the forests. When being identified, they would report to Forest Ranger Station and waited for solutions to implement. There were six foresters in one working station. They were separated into three groups of two. Each group altered to stay at the station and check every member getting up to the mountain, and the other two groups would go on patrol in forests simultaneously. Fuxiang Yang, an interviewee, was one of them, and below is the economic and environmental contribution of foresters from Yang's perspective.

3.2.1.1 Economic Contribution

Foresters receive income from the government. Yang has three jobs, the forester, farmer, and bird pond owner. Among the three, being a forester is the main source of income and more stable than the other two. Despite direct economic impact, foresters work for a better forest environment, which attracts birds to come and live around bird ponds. Their efforts to protect the forests also help with development of birdwatching industry.

3.2.1.2 Environmental Contribution

Cultural norms and local regulations are often influential in environmental protection. Descola [5] proposed that the western theories on environmental contributors were not universal. Jobin et. al. [10] further supported this idea by emphasizing how political movements could impact the environment in Asian countries by integrating case studies from nine regions. Taking Thailand as an example, there was a decline in environmental movements in rural areas due to the political instability, such as military changes in the government, which led to a declining public awareness on environmental issues. Similar idea fits the circumstance in Baihualing. Foresters worked at the frontline to identify and report violating behaviors, while the Forest Ranger Station determined the penalties according to their reports. Environmental policies and strategies were implemented according to frequently seen behaviors in the village.

The implementation helped reduce uncivilized behaviors in the forest. From 2005 to 2008, when the working station initially started, uncivilized behaviors were common. For example, villagers may cut down trees in reserve area to build houses. Through strict penalty rule, such as several hundred or even thousand RMB for cutting down trees of a square meter, and publicizing the importance of forest protection, such behaviors reduced significantly in recent days. As Yang mentioned, he has not seen any abnormality since the start of 2025.

The effective forest protection also brings better climate in Baihualing. The climate has become more humid with lower temperature compared to 1980s. Also, it is more comfortable in Baihualing compared to other villages down the mountain, or the ones at the same height but with less forest area. This brings increase in number and species of birds and insects, contributing to increasing biodiversity.

Overall, the Baihualing environment has improved with forest protection adapted to Baihualing situations, which indirectly helps with the birdwatching industry development.

3.2.2 Farmer

Farmer is the most common job in Baihualing because families would each be allocated with their own piece of land, no matter large or small. They would all plant crops, such as mangoes and coffee beans, to prevent wasting. Every interviewee involved is a farmer, but none of them takes it as a full-time work. Most of them mentioned the farmer to be an unstable work, where many factors could influence the profit, such as weather and market price of the crop.

Farmer's interaction with forest involves a transition from cutting down trees to forest protection. In the past, farmers would cut down trees to plant crops to maximize profit, but this countered with bird pond owners' need to maintain the forest environment to attract birds. The bird pond owners had no right to intervene farmers' decisions because the farmers had the forest rights. The change came when the "Bird Protection Villager Association" (in Chinese, "爱鸟护鸟协会") was set up. It divided the profit of bird pond tickets into five parts for each party directly or indirectly involved. Farmers are involved in the party "Association Member (All villagers)", who received 28.6% (20 RMB) of each ticked sold. [9] This allowed every villager to gain from birdwatching industry, and thus, everyone would strive to protect forests, including farmers. Foresters' enforcement and publication of forest protection importance also played an important role. Through the efforts, farmers stopped cutting down trees and began protecting the forest.

Overall, farmers could only generate part of income for villagers, and their interest is contrary to forest protectors, which was then altered through sharing dividends from bird pond tickets. Nowadays, they act as forest protectors like other villagers.

3.2.3 Research Technician

Research technicians work for research teams to help them identify birds and better understand their characteristics. For villagers in Baihualing, the research programs they involved in are mainly from Yunnan University. They usually go on slack seasons and come back before the boom season to operate bird ponds or take on other jobs associated with birdwatching. Two interviewees Zhaoxian Yang and Quan Liu are research technicians, and they often participate in programs together.

Since the research usually takes place outside of Baihualing, this occupation only has economic contribution. Zhaoxian Yang said the income from research technician took the largest percentage among all different occupations he took, but this was not the case for Quan Liu, whose main income came from ecotourism. Therefore, it could be concluded that being research technicians contribute at least some part of the villagers' income, but the percentage may vary from different individuals.

3.3 Environmental Stakeholders

Non-human stakeholders could also contribute to changes in economy and environmental. Hathaway [7] identified how elephants could reframe the conservation strategies in Yunnan. The population of elephants increased unexpectedly with the restrictions on hunting, and they disrupted villages and crops. Thus, people were forced to change conservation rules and adapted this new circumstance. Similarly, in Baihualing, the changes of environmental stakeholders, more specifically, forest, birds and other wild animals, contributed to varying performance of human economy and Baihualing ecological environment.

3.3.1 Forest

Number of trees and area of forest increases with improvement in climate. Forester Fuxiang Yang emphasized the significant improvement of forest environment with the efforts of forest working station and penalty rules. Less trees were cut down, and the climate became rainier compared to villagers at similar altitudes. This result is also proved by official data. According to data collected by Department of Natural resources of Yunnan Province [9], the forest area increased from 82.3% to 95.09% as birdwatching developed. Environmentally, besides direct increase in forest area, the better environment brings more birds and more wild animals, which increase biodiversity in Baihualing. Economically, the attraction of more birds and animals helps further develop the birdwatching industry and ecotourism by attracting more nature enthusiasts. The change of forest environment indirectly contributed to the promotion of birdwatching industry and pushed the development further.

3.3.2 Birds

Different from zoos management, birds in Baihualing still have free will to determine what to do and where to go. Taking Baozhi Ge's observation as an example, though bird pond owners put mealworms as baits to attract birds, many birds would not go for the food in summer, but only appear in winter, when there is lack of food. There is no enforcement for birds to live or eat on the bird ponds, unlike the intervention of human regulations in zoos. Birds are the main attraction for tourists, so gathering more birds would attract more birdwatchers to visit. This further promotes the birdwatching industry by bringing extra economic profits for the bird pond owners.

Besides the general growing trend, the change of birds' actions in one period could guide human behaviors. Kohn [6] proposed that animals and nature could give signs that humans interpret to change implementation policies and plans. As more birds gather in bird ponds to forage, this generates a sign for bird pond owners that the cold season with wild food shortages is approaching. This implies an upcoming boom season for birdwatching. Thus, bird pond owners would open the bird ponds that are closed in slack seasons to maximize their profits.

3.3.3 Other Animals

There were increasing insect species and other wild animals in Baihualing along with environmental protection. There were even new species identified by villagers and named after their names. For example, Baozhi Ge recognized three new species and named them by combining his name and the group the insect belongs.

Also, despite commercialization of bird ponds and birdwatching industry, the high-altitude area of GaoliGong mountain is allocated as reserve area, where people are prohibited from entering. This ensures little people intervention in the reserve area and allows animals to control the wild world. This helps improve biodiversity evidenced by more frequently seen animal traits around, such as bear footprints on the side of pathways to bird ponds.

3.3.4 Overall

When Ge Gao heard concerns regarding bird ponds and people intervention's influence on the environment, he pointed out the ability of nature to self-adjust. People's behaviors may influence individual birds or animals, but the effect could be negligent when seeing the species or population as a whole. Overall, the future of environmental factors in Baihualing is promising which contributes to reserve area conservation and rapid development of ecotourism.

4. Conclusion

4.1 Impact Overview

People and nature codependent on each other in Baihualing. People protect nature: protecting forest, providing extra food for birds etc., while nature pays back with economics development opportunities, such as the birdwatching industry. The interaction process makes both sides better off. The economy of Baihualing developed faster with the development of birdwatching, while climate improves, and bird species increases. This highlights the dynamic balance between economic development and environmental protection where human and non-human contributor jointly bring the harmony. Thus, in the future, Baihualing should seek ways to sustain this balance and continue developing birdwatching industry while maintaining ecological protection.

4.2 Limitations

There may be some limitations regarding the information from interviews and participant observations from two aspects. First, there could be potential bias in interviewees involved. All interviewees were introduced by Baozhi Ge, and he was by the side when the interviews were conducted. This may lead to interview bias, where the interviewees failed to express their true ideas or beliefs. This limitation may affect the validity of the data collected. Also, most information from the villagers is based on their observation and experience, but they lack enough academic background to give further proof. Since some changes are depicted to limit to Baihualing, there is lack of academic research or more in-depth understanding.

4.3 Further Recommendations

Some bird pond owners are still lacking professional knowledge for bird protection and bird characteristics, and they would introduce false information for birdwatchers. For example, a bird pond owner Yuan introduced Lady Amherst's pheasants were more frequently seen in winters because of their breeding season. However, it was wrong. Lady Amherst's pheasants' breeding season is in April to summer, and they are common in winter because of lack of food in the wild at the time. Baozhi Ge mentioned that this story was not a single case, but quite prevalent among bird pond owners. Though there is improvement in bird pond owners training, it still needs standardized training for more professional background to help with bird pond management and bird protection.

Additionally, the current birdwatching industry is concentrated on business directly related to birdwatching, such as inns and bird ponds. This leads to over competition among villagers, where most inns would not be full even in boom seasons. Currently, there is only one small convenience store and a coffee shop which has already shut down. A more diverse development for more stores or entertainment designs may target a larger demographic and further develop tourism to increase profit for villagers, maximizing the benefits.

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