Achieving Wetland Conservation by Improving the Welfare of Local People a Practice of Win-Win Paths in Southwestern China

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Abstract. The coordination of protection and development has always been one of the most important contents of nature reserves' healthy development. Thus, the resources conservation and poverty alleviation should be achieved simultaneously. As a link between nature reserves and communities, farmers' opinions and feedback are very important. Based on the household survey in Lashihai Wetland Nature Reserve in southwestern China, and compared with the feasibility and applicability of a variety of evaluation methods, this study finally determined its own classification of ecological service function value and the corresponding evaluation methods, and then calculated all kinds of values and the total value of Lashihai Nature Reserve. This study also expounded a win-win path that led to the coordinated growing of resources conservation and community development, it indicates how the poverty relieve practices can help improving the conservation and restoration of wetland resources.

Keywords: Wetland Conservation · Win-win Paths · Nature Reserve

1 Introduction

China's nature reserves are mainly distributed in remote rural areas and mountain areas where the ecological environment is fragile and underdeveloped [1]. The self-development capacity of these regions is generally weak, and the local farmers are more dependent on various kinds of natural resources, which in turn leads to the problem of over-utilization of resources in most areas [2]. To a certain extent, the establishment of nature reserves eased the excessive resource consumption, but it also restricted the traditional way of farmers' life as well as the regional economic development. In market economy, the basic contradictions of ecological economic development is between the individuality of production and the social nature of ecological environment [3]. Under the pressure of huge community population, the traditional, compulsory, top-down management way of nature reserve used to pay more attention to the protection

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Fig. 1. The wetland ecosystem of Lashihai Wetland Nature Reserve in Yunnan Province, which was designated as one of the Wetlands of International Importance in 2004 for its extremely biodiversity importance.

of natural resources, while ignored the interests of farmers. In particular, local farmers, especially those living in peripheral community of natural reserves, nether get reasonable compensations nor did have chances to find a job from the corresponding industry, which generate the problem of poverty. Thus, the contradiction between farmers and nature reserves became more and more prominent [4, 5]. Correspondingly, poverty can increases resource pressures, and this vicious circle will finally leads to irreparable resource destruction. Thus, how to achieve the goals of resources conservation and community development has become a top priority in recent years.

Through the case study of typical wetland nature reserve, the Lashihai Wetland Nature Reserve in Yunnan Province, China, the study introduced a method to promote the conservation of resources and meanwhile facilitate the development of communities (Fig. 1). Through the typical case analysis, the study indicates that there is a way to achieve the win-win outcome of resource conservation and community development by establishing a set of collaborative development and mutual improvement mechanism.

2 Study Area

Between NL 26°51′41.0″–26°56′38.3″ to EL 100°05′17.4″–100°10′11.8″, the Lashihai Nature Reserve lies in Lijiang City, Yunnan Province of China. The Lashihai Nature Reserve is in the convergence zone of a variety of creatures. The recorded number of bird species is 225, which is the amount and type of the most of the wetland waterfowl species in Yunnan. Besides, a variety of rare and endangered bird species, such as Chinese merganser, black stork, black-necked crane, grey crane, whooper swan and some other class I or II national protected wild animals, need to go through the Lashihai Nature Reserve to finish their migration or wintering in wetlands here. According to the field research, the Lashihai Nature Reserve is both migrating post and wintering ground for migratory birds, and the Nature Reserve is also the first stop after the visitors cross the Himalayas. According to the experts of Chinese Academy of Sciences in Kunming Animal Research Institute, once the Lashihai Nature Reserve is destroyed, those migratory birds would be unable to cross the Himalayas, thus posing a great threat

to their survival. Therefore, the Lashihai Nature Reserve raised due to the proper time and conditions in 1998, and it was designated as one of the Wetlands of International Importance in 2004 for its extremely important migratory bird resources.

3 Methods

The use value of this study refers to the value that China's nature reserve produces with the purpose of providing products or fulfilling some kinds of human needs. The use value includes direct use value and indirect use value, often known as available value or useful value. According to the functions and the characteristics of Lashihai Nature Reserve, this study conducted evaluation of its use value, namely the evaluation of ecosystem service function value. In this study, the direct use value is defined as the value of products and services to humans directly provided by a nature reserve, including the value of products of plant resources, animal resources, as well as the value of tourism, scientific research and cultural, etc. Hence, it can also be considered as the value that the economic function of nature reserve provided. The ecological service function also reflected its indirect use value. It is defined as the value of water conservation, water purification, water provision, climate regulation and biodiversity maintenance (Table 1).

It should be pointed out that the study followed some of the traditional methods, such as the division of global ecosystem services by Costanza and some other people [6].

(1) The market valuation method is a kind of method that could assess the value of ecosystem products and functions with market price, and this study mainly focused on those material ecosystem products [7].
(2) The surrogate market approach can also be embodied as carbon tax method and afforestation cost method. For instance, according to the equation of photosynthesis, the amount of fixed CO_2 and released O_2 can be converted to the amount of

Table 1. The classification and corresponding evaluation methods of ecological service function value

Item	Classification of Values	Methods
Direct Use	Resource	Market Valuation Method
	Tourism	Expense Payment Method
	Scientific Research	Results Reference Method
	Culture	Expense Payment Method
Indirect Use	Water Conservation	Shadow Project Approach
	Water Purification	Shadow Project Approach
	Water Provision	Market Valuation Method
	Climate Regulation	Surrogate Market Approach
	Biodiversity Maintenance	Results Reference Method

production of dry matter. And in the light of international and China's standard of CO_2 emissions [8], the study converts the ecological index into the economic index, which finally results in the economic value of CO_2 fixation.

For example, V stands for the total value of climate regulation, V_{CO2} stands for the CO_2 fixation value, V_{O2} stands for the O_2 emission value, V_{adjust} stands for the temperature & humidity regulation value and V_{out} stands for the greenhouse gas emission value.

$$V = V_{CO2} + V_{O2} + V_{adjust} - V_{out}$$

(3) The shadow project approach refers to the artificial construction of a project, which is aimed at replacing the ecological function or destructing the original ecological function, like the water supply value equals to the product of total moisture adjustment quantity and the cost of unit capacity of the storage capacity.
(4) The expense payment method is widely used for describing the value of natural sights or environmental resources that cannot be represented as the market price completely. Thus, it represents the economic value through all the spending and cost during tourism activities. To be specific, the study underlined the service functions of Lashihai Nature Reserve, and delivered its own evaluation methods.

Like the scientific research value, the experimental area of nature reserves is accessible and it can hold a series of scientific activities such as scientific experiment, practice teaching and study tours. Therefore, this study has only taken the experimental area into account when calculates the value of scientific research. According to the survey, it is well-known that Lashihai Nature Reserve was designated as one of the 30 wetlands of international importance in China by the Chinese government in 2004, and it was listed as the popular science education base of wild animals in 2005 (Table 2). This study defined the culture value of the reserve as the value of propaganda, science education, academic papers and subject.

Table 2. The animal and plant resources of Lashihai Nature Reserve

Item		Species	Quantities
Animal Resources	Total	566	3384
	National Important Protected	40	96
	Class I National Protected	8	108
	Class II National Protected	32	3180
Plant Resources	Total	566	-
	National Important Protected	8	-
	Class I National Protected	2	-
	Class II National Protected	6	-

4 From Resource Conservation to Farmers' Welfare

To sum up, the total value of ecosystem service of Lashihai Nature Reserve is RMB 198.44 million yuan. Among all kinds of values, the climate regulation value ranks first with RMB 79.35 million yuan·a-1, accounting for 39.99% of the totality, then followed by the tourism and resources value, while water purification value comes the last, which is to be about RMB 0.48 million yuan·a^{-1} (Table 3).

Generally speaking, the main point of wetland resources conservation is to protect and restore the wetland' ecological environment, to protect the habitat and to utilize the resources rationally; but the particular case in this study also took farmers' livelihoods into consideration. After interviews and questionnaire investigations with different kinds of farmer households, the study concludes that farmers' poverty conditions are partially brought about by the incompleteness and instability of policy design and intensified during the implementation phase. For example, the wetland compensation policies, such as wetland ecological compensation and ecological migration compensation, did directly increase farmers' income and broadly accepted by them, however, compensation policy itself can not truly ensure farmers' long-term income, let along reduce their vulnerability and enhance their development capacity in the long run. In other words, the over-reliance of compensation policies can only produce short-term gains, if the local conditions cannot be improved during the compensation period, those affected were more likely to relapse to their traditional resource-consuming way of production and living when the policy ceases to be implemented, such as illegal hunting, fishing and deforestation. Apart from that, the compensation quantum of projects like the Forest Tenure Reform Project and the Grain for Green Project were usually not enough to make up for farmers' losses; what is more, although the ultimate goals of these projects are turned out to be good for farmers, policies promulgated by government are often unattractive to farmers, and the policy benefits were often too hard to obtain in consideration of farmers' poor development

Table 3. Results of use value in Lashihai Nature Reserve

Classification of Values		Value (million yuan·a-1)	Percentage (%)	Rank
Direct Use	Resources	18.48	9.31%	3
	Tourism	55.02	27.73%	2
	Scientific Research&Culture	15.78	7.95%	4
Indirect Use	Water Conservation	7.44	3.75%	7
	Water Purification	0.48	0.24%	8
	Water Provision	9.66	4.87%	6
	Climate Regulation	79.35	39.99%	1
	Biodiversity Maintenance	12.23	6.16%	5
Total		198.44	100.00%	

foundation and relatively blocked way of thinking, which made it difficult to transform the development pattern, let along the ecological conservation and poverty alleviation.

Inappropriate policies can also disrupt farmers' normal lives and lead to poverty, it is important to find a suitable way to achieve goals of both ecological restoration and community development. Many studies have been conducted in exploring ways and means to coordinate the relationship between nature reserve and community development, and proposed a series of coordination mechanisms such as comprehensive protection, community development, community co-management, in order to address the conflicts between nature reserves and communities [9, 10]. The survey results showed that farmers have different views on the coordination of nature conservation and community development, some believe that protection should be the fundamental goal, no matter what it takes, but most believe that the protection of resources will do good to community's long-term sustainable development, while there is always a way to ease the contradiction between protection and development, maybe through the approaches of community participation, management innovation and management system perfection.

In summary, a successful resource conservation strategy must take farmers' livelihoods and welfare into consideration. Policy makers have to develop effective schemes that account for both the unique characteristics of the local environment and the needs of farmers; in other words, it is necessary to recognize the important role of natural resources by explicitly planning for economic development, such as changing the traditional way of development after implementation of the plan. This study provides a model for the achievement of a harmony and win-win situation between humans and environment.

5 From Farmers' Welfare to Resource Conservation

Cooperated with Lashihai Wetland Nature Reserve, an international important wetland in Yunnan Province, the study conducted household survey and face-to-face interview in July. 2015, with the purpose of understanding the effects of policies introduced by the local authorities in achieving the win-win strategy between wetland resources conservation and community development.

Though Lashihai Wetland Nature Reserve has become an international important wetland for years, however, farmers' traditional resource-consuming way of production and living still remain unchanged. With the increased population and relatively occluded geographical location, the traditional farming areas quickly extended to the wetlands surrounding areas, which squeezed the wetland area and reduced the water storage capacity, and moreover, it decreased the vegetation coverage and reduced wetland biodiversity; on the other hand, the destruction of wetlands, as well as the unreasonable use of resources ultimately increased the poverty level of local farmers. Faced with this situation, the nature reserve was established, as the gradual restriction of protection policies eased the tension of resources, it also changed the traditional way of production and life of farmers, which resulted in the escalation of conflict between nature reserve and communities.

To protect wetland resources and alleviate poverty, the local government implemented wetland compensation policies to farmer households. However, the conflict between nature reserve and community further escalated. Based on the survey of local

farmers, the study considered that the fundamental task of the win-win practice is to change the development mode, and enhance farmers' development ability. Based on the former failed attempts, this study indicates that farmers' economic appeal is also important, which is not only achieved by means of government subsidies, but also that all of the resource conservation practices should be taken into consideration◦.

Based on this understanding, the nature reserve guided and help building up the new-type rural cooperatives specialized in running horse farms, which were strongly supported by The Nature Conservancy (TNC) and other NGOs. The cooperatives share the earnings with farmers who participated in and partly liberate them from traditional occupations of farming. As member of the cooperatives, all farmers shall provide horses to the running horse farms and then they were qualified to share the earnings (Fig. 2). This kind of wetland resource conservation practice under the guidance of win-win strategies calls for the cooperation among different kinds and levels of governments, nature reserves and farmers. As a result, more than 300 households of the local people get rich through this kind of ecotourism, and their per-capita income increased from RMB 3180 yuan to RMB 7000 yuan; moreover, government ensured the development of cooperatives by means of transfer payments, such as subsidies and allowances. In particular, cooperatives can provide sustainable income for farmers themselves with or without government assistance. This feature of cooperatives is rarely seen in previous practice, which greatly improves the independence, vitality and sustainability of cooperatives.

Besides, the establishment of new-type rural cooperatives changed the relationship between farmers and wild animals, too. The reserve-farmer relationship was at a low point during 1998 to 2002 when the reserve first established, the damage brought by the visitants was considered to be the reason: the damage of Grey Crane can results in the total crop failure of broad bean, and the total annual economic losses can be more than RMB 5 million yuan. On the other hand, the core function of Lashihai Wetland Nature Reserve is to serve as the migrating post and wintering grounds for visitants, as well as being the first stop after those visitants crossed the Himalayas; if the wetland once be destroyed, those visitants would become unable to cross the Himalayas, which would pose a great threat to their survival (Fig. 3). Thus, any behavior of farmers that hurts the visitants is illegal. For a long time, farmers can only bear the loss by themselves. This

Fig. 2. The new-type rural cooperatives around the Lashihai Wetland Nature Reserve, specialized in running horse farms.

Fig. 3. The Lashihai Wetland Nature Reserve functions as the thoroughfare and wintering grounds of many kinds of migratory birds. The recorded number of bird species is 225, which is the amount and type of the most of the wetland waterfowl species in Yunnan.

situation did not change until the setting up of horse farm cooperatives, which provided enough income for farmers, and the old contradictions alleviated with the decreased dependence of farmers on planting.

In addition, though the nature reserve did a lot in easing the contradictions between itself and farmers, illegal behaviors are still strictly prohibited by necessary compulsory measures. For instance, wildlife resources is protected by relative laws, illegal killing would be prosecuted for criminal liability as well. It is worth mentioning that the nature reserve staffs captured more than 10,000 pairs of fishing gears in 2008, most of which are illegal ones like ground cages and electric batons. The daily average quantity of fishing is about 25kg, which equals to RMB 300 yuan. Driving by the economic interests, it has been common for farmers to go fishing with their ground cages. Under the situation, most of the attention of nature reserve has been paid on the regulation of illegal fishing, corresponding restrictive criteria such as the width of mesh are made, too. Similarly, another example is about illegal felling. Since the Lashihai Wetland Nature Reserve was founded in the year of 1998, the Project of Closing Hillsides to Facilitate Afforestation was implemented. Thus, the whole protected area was no longer assigned cutting quota, which brought about occasional illegal felling. In order to stop the illegal behavior, the nature reserve hired 17 supervisors, each of which taking a GPS device along with them for purpose of monitoring, supervising and species exploration.

6 Conclusions

Based on the understanding above, this study argues that "fairness" is an important factor affecting the efficiency of property and market, which means the loss of fairness leads to the decrease of efficiency. The establishment and development of nature reserves is not only a process of closed protection of resources, for farmers in peripheral community of natural reserves, the development of nature reserves must ensure farmers' income, reduce their vulnerability and enhance their development capacity. At the same time, the coordination of protection and development has always been one of the important contents in the operation of nature reserves. As a link between nature reserves and communities, farmers' opinions and feedback are important basis for the formulation and

improvement of nature reserve policies. Therefore, it is of great significance to integrate conservation and development into the functions of nature reserves, to emphasize community involvement and equity in the work of nature reserves, so as to get the support of farmers. The study is helpful to alleviate the contradiction between resource protection and community development, as well as to improve the living standard of farmers, and then get the support of them for the development of nature reserves.

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