

Original Article

Stakeholder Conflicts under the Current Nature Protection Policy in China: A Case Study of the Wuyishan National Nature Reserve

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As a consequence of the rapid development of nature reserves in China, conflicts between nature protection and local economic development threaten ecological diversity and hinder economic development. The primary purpose of this study is to identify stakeholders involved in the conservation of the Wuyishan National Nature Reserve (NNR) and to clarify any conflicts among them. In the Wuyishan NNR, bamboo and black tea production are the principal industries. Several conflicts were discovered among the stakeholders in the Wuyishan NNR at varying degrees. A major conflict was identified between the Administrative Bureau, local township government, and the village committee regarding issues such as inadequate infrastructure maintenance, eco-compensation monetary values, and wildlife protection. Medium-scale conflicts exist between the Administrative Bureau and local stakeholders from the township government, the village committee, business owners, and farmers. Furthermore, not to be ignored, a minor conflict between farmers and a large number of migrant workers currently engaged in tea farming and bamboo forest management is also contributing to instability of the nature reserve's forestland management. At the same time, stakeholders consider ecotourism development as a means to improve the economic situation of the Wuyishan NNR.

Key words: nature protection, local economic development, nature reserve management, stakeholder conflicts

I Introduction

Protected areas in China are composed of nature reserves, scenic areas (often referred to as national parks), and forest parks (Liu *et al.*, 2013). However, China's approach to protected areas does not follow the management categories proposed by the International Union for Conservation of Nature and Natural Resources (Lewis, 1995). The People's Republic of China on Nature Reserve Ordinances, promulgated by the State Council and effective as of December 1, 1994, defines nature reserves in China: areas, such as land, inland water bodies, or marine districts that represent various types of natural ecological systems, or a naturally concentrated distribution of rare and endangered wild animal or plant species, or where natural traces or other protected objects with special significance are situated, or places designated for special protection and administration according to relevant laws. China's first nature reserve, the Dinghushan Nature Reserve in Guangdong Province, was established in 1956. By 2012, a total of 2,658 nature reserves had been designated at county, provincial, and national levels (Ministry of Environmental Protection of China (MEP), 2012).

However, protection of natural environments and

ecological biodiversity is still very challenging within the country's nature reserves. In particular, nature reserve conservation and local economic development created competing needs, causing many disputes among stakeholders. Local people living within NNRs or surrounding areas rely heavily on natural resources, which may threaten the ecological diversity of nature reserves. In other words, to some degree the designation of nature reserves has hindered local economic development (Wang *et al.*, 2010; Long and Li, 2014; Xu *et al.*, 2016). Therefore, it is vital to balance the needs of different stakeholders in order to avoid conflict rooted in inconsistent decision-making by authorities at different levels of government and the irreconcilable demands of opposing interest groups (Shepherd and Bowler, 1997).

General studies depict administrative problems (Bian, 2003) and management strategies that proved to be impractical with little possibility of implementation (Liu and Shi, 2003). However, case studies that take into account specific geographic and economic situations (e.g., Jim and Wu, 2002) are still lacking due to the prohibition of entry into nature reserves, as well as a lack of relevant research efforts. Permission is required by anyone wishing to gain entry into a nature reserve by the administrative authorities, usually a provincial forestry department. With the rapid development of nature reserves since 1979, the majority of

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relevant experts are addressing their planning and environmental management. Consequently, empirical research regarding stakeholder conflict is still scarce as resources are focused elsewhere. Thus the purpose of this study is to identify stakeholders involved with the conservation of the Wuyishan NNR and to clarify what conflicts exist among the stakeholders.

II Methodology

A combination of literature review, qualitative in-depth semi-structured interviews, and participatory observation approaches were employed in this study.

A stakeholder analysis framework was applied to this study. Stakeholder analysis is an appropriate approach for understanding the conservation and economic development issues in Chinese nature reserves (Zhou *et al.*, 2014). Stakeholder analysis in development and natural resource management has been applied to empower marginal groups who would otherwise have no easy access to well-established social networks (Johnson *et al.*, 2004). Stakeholder analysis is used to identify individuals, groups, and organizations that are affected by or can affect those social and natural phenomena by a decision or an action and to allow involvement by these individuals and groups in the decision-making process (Reed *et al.*, 2009).

Twenty interviews varying from 30 to 60 min in length were conducted in person for our research, between September 23rd–27th, 2014, following pre-survey interviews between March 15th–21st, 2014. A further follow-up supplementary survey was conducted in November 2014. Respondents included the Administrative Bureau of Wuyishan NNR (two administrative office staff), local authorities (one village head and one village committee member), and local people, such as owners of grocery stores, restaurants, guesthouses, and black tea traders.

III Survey site

Because of its significant biodiversity and its geographic location in the coastal region where the economy is rapidly developing, the Wuyishan NNR was selected as the case study with the above mentioned objectives. The coastal region in China accounts for only 14% of the total land area, but contributes approximately 60% of the national GDP. The Wuyishan NNR is the only Chinese site designated as a UNESCO bio-

sphere reserve, as well as a World Mixed Natural and Cultural Heritage Site. Wuyishan's outstanding value comes from its subtropical forest biodiversity, unique to Southeast China, and the large refuge it provides for a great number of ancient relic plant species, species endemic to China, and an abundance of amphibians, reptiles, birds and mammals. Among them, many are endemic, rare and endangered species, such as Ginkgo (*Ginkgo biloba*, Linn.), Chinese swamp cypress (*Glyptostrobus pensilis* Staunton ex D. Don), and Clouded leopard (*Neofelis nebulosa*, Griffith).

The Wuyishan NNR's borders extend into two provinces, Fujian and Jiangxi. In this paper, the survey site is restricted only to that part in the Fujian Province, named the Fujian Wuyishan NNR. The Fujian Wuyishan NNR (Fig. 1) is located at Longitude 117° 27' – 117° 51' East, and Latitude 27° 33' – 27° 54' North, and has an area of 565 km². The average elevation of Wuyishan is 1,200 m, with the highest point being 2,158 m at Mt. Huanggangshan's peak. It accommodates approximately 3,306 species of plants, 475 species of animals, and 4,635 species of insects; of this vast range of flora and fauna, 77 species are listed as endangered by the state (UNESCO, 2010).

The Administrative Bureau of the Fujian Wuyishan NNR⁽¹⁾ was established in 1979, as subordinate to the Forestry Department of the Fujian Province. Its budget is allocated by the Finance Department of the Fujian Province. According to 2015 records, 112 staff mem-

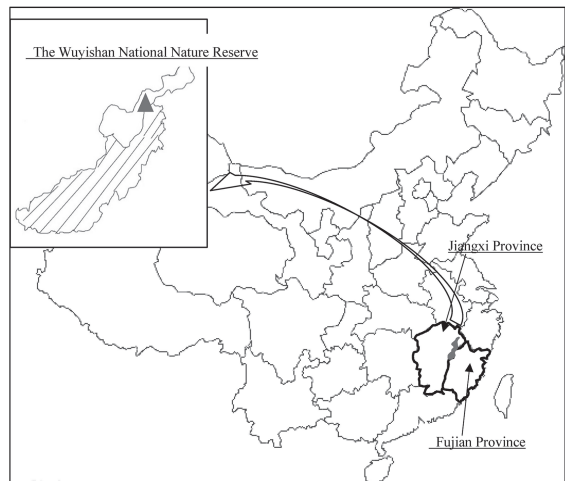


Fig. 1 Map of survey site.

The darkened-border area shows the Wuyishan Nature Reserve in the north part of the Fujian Province. ▲ shows the highest mountain, Mt. Huanggang, which is located on the boundary of Jiangxi Province (left side) and Fujian Province (right side).

Table 1 Socio-demographic characteristics of villages located in the Fujian Wuyishan Nature Reserve.

Administrative village	Natural village	Registered population		Education level		Economic status/per capita			Migrant workers
		Household	People	Senior high school or its equivalent	Junior high school or below	Farmland area (ha)	Crop products (kg)	Income/year (RMB)*	
Tongmu	33	384	1,503	23	1,480	0	0	3,073	210
Aotou	2	90	391	4	387	7	0	3,682	44
Dapo	2	96	397	15	382	7	400	3,508	50
Guilin	2	47	217	17	200	0	0	2,709	0
Total	39	617	2,508	59	2,449	14	400	3,403	304

Note: *100 RMB is equivalent to 15 USD.

Source: Data was provided by Prof. Chuan Tong, Fujian Normal University.

bers composed the administration office, finance division, protection management department, community management department, forest public security division⁽²⁾, and the five administrative offices in Tongmu, Huangkeng, Da'an, Pingshan, and Longhu.

IV General situation of the Wuyishan NNR

1 Socio-demographic characteristics

Table 1 shows the socio-demographic characteristics of the four administrative villages in the Wuyishan NNR consisting of 39 natural villages with 2,508 people. Sixty percent of the population lives in Tongmu Village, Xingcun Township⁽³⁾, where the Wuyishan NNR Administrative Bureau is located. Farmland is scarce at 0.07 ha per capita, with only two of the total 39 natural villages having cultivated farmland.

The Hakka people have lived in the Wuyishan Nature Reserve's region for thousands of years, making their living on timber, chestnuts, tea, bamboo, and various non-timber forest products, since long before the establishment of the official Wuyishan NNR in April 1979. The Wuyishan NNR consists of 60% collectively-owned forest and 40% state-owned forest (UNESCO, 2010).

2 Economic activities and environmental impacts

At present, villagers in the region are primarily economically engaged in bamboo plantations, black tea production and sale, and some small businesses. According to an online interview with the Mr. Liang, the Director-General of the Administrative Bureau of the Wuyishan NNR, Yuanrui, the annual bamboo timber harvest varies from 400,000 to 600,000 trees and annual black tea leaf production varies from 80 to 100 tons. Currently there are 394 tea-processing plants and four restaurants within the Wuyishan NNR.

(1) Bamboo production

Bamboo has been the principal industry within the Wuyishan NNR. Bamboo is a very useful material for handicrafts and daily living needs. However, promotion of bamboo planting and the improvement in bamboo product processing have caused ecological and environmental problems that threaten the Reserve. For example, in order to maximize bamboo production, and therefore profits, the forest understory was clear-cut and the mixed broadleaf trees were removed. The disposal of processing waste is also a challenge to the Reserve, thus processing plants inside the Reserve were closed several years ago. Today, cut bamboo is transported after harvesting to nearby cities.

Bamboo forests have invaded surrounding broadleaf forests, increasing their coverage by 20%, from 6,700 ha in 1979 to approximately 8,000 ha in 1997 (Zhou, 1999). Ecologists and administrative staff in the Reserve are also concerned about ensuing ecological threats (Zhou, 1999).

(2) Black tea production and non-timber forest products

Local vendors were able to significantly increase the price of black tea after it was discovered that the Wuyishan NNR is the birthplace of black tea, and the origin of Wuyi Lapsang Souchong black tea. Consequently, Lapsang Souchong black tea became nationally well-known and local tea production received a boost. Black tea production in the Xingcun Township amounted to 700 tons (quantity counts are for fresh tea leaves) in 2012, approximately 2.4 times that of 2001 (Wuyishan Statistical Bureau, 2001, 2012). Small home gardens have been transformed into tea gardens, as it is prohibited to convert protected Wuyishan NNR forestland into tea gardens.

Another ecological concern arose from the demand for firewood used in tea production. It is said that Lapsang black tea has a specific taste and scent, and that

the specific scent is from the Huangshan Pine (*Pinus taiwanensis* Hayata) or Masson's pine (*Pinus massoniana* Lamb.) used as the firewood for the tea's production. Due to the regulation of cutting in the protected forest, it is difficult to secure the firewood supply that is needed to produce high quality black tea.

3 Ecotourism activities

Ecotourism was practiced inside the Wuyishan NNR from 1996 to 2007. According to the Administrative Bureau of the Wuyishan NNR, tourist numbers doubled during that 12-year period, increasing from approximately 15,000 tourists in 1996 to 30,000 in 2007. However, ecotourism has ceased since 2009 and tourists are prohibited from entering the Wuyishan NNR.

The Administrative Bureau ceased ecotourism due to its associated environmental impacts and low contribution to the local economy. For example, the wild daylily (*Hemerocallis citrina* Baroni) sharply declined with increased exposure from guided tours incorporating the flowers as an ecotourism attraction. However, according to Dr. Zeng, Fujian Normal University, there was another reason for the cessation of the ecotourism industry in the Reserve. The Jiangxi Wuyishan NNR blocked access to the primary attraction, Mt. Huanggangshan's peak, because the Fujian Wuyishan NNR rejected its request to share in the revenue from the entry fee. The peak of Mt. Huanggang is located in the Fujian Province; while part of the road to the mountain peak belongs to the Jiangxi Province, the Jiangxi Wuyishan NNR administrators believed that entitled their office to a share in the profits.

V Results

Benefits and costs perceived by stakeholders under current conservation and tourism policies are listed in Table 2 based on interviews with key stakeholders, which are summarized in Table 3. Conflicts existing among stakeholders are listed below. These conflicts have influences on natural protection at varying degrees (Fig. 2). In this study, the observed conflicts were further classified into three groups according to what extent the conflicts can influence the success of natural protection in the Reserve. A major conflict regarding protection regulations and environmental management exists between the Administrative Bureau and the local stakeholders from the township, the village committee, small businesses and farms (Fig. 2). This

major conflict refers to one that plays a determinant role in affecting the success of natural protection in the Reserve. Under the supervision of the Forestry Department of the Fujian Province under the State Forestry Administration, the Administrative Bureau implements strict policies to protect the natural environment. The policies, however have greatly limited local economic development. Additional medium conflicts can be also observed among, the Administrative Bureau, the local township government, the village committee, small business owners, and farmers. This medium conflict refers to one affecting the success of nature protections in the Reserve to a significant degree. Meanwhile, conflict between local famers⁽⁴⁾ and migrant workers is minor, only slightly affecting the implementation of conservation in the Reserve.

1 Benefits and conflicts over nature protection policies

Since the establishment of the Wuyishan NNR, strict nature protection policies have been implemented. As a result, the natural environment has improved, thereby improving tea quality as well.

According to the Regulations of the Fujian Wuyishan NNR (implemented since October 1, 2015), nobody shall be allowed to enter the core area. No production activities, except scientific research, educational practice, and specimen collection, are allowed in the buffer zone. Furthermore, extension of farmland, tea gardens, and bamboo forests are prohibited in the experimental zone.

However, strict regulations to protect wildlife have resulted in a significant increase in their numbers, threatening farming activities and local people's livelihoods. Both Administrative Bureau staff and local people mentioned increasing damage by wildlife to bamboo shoots and tea trees since the establishment of the Wuyishan NNR and its ensuing nature protections.

According to Ms. D. (30s, staff member at the Administrative Bureau, Respondent No. 2 in Table 2), losses caused by wild boar and monkeys were estimated at more than one million RMB/year (equivalent to 150,000 USD). While the Bureau reported the situation to the Fujian Province Forestry Department, their response was just "to survey and count the number of wild animals". Thus, the issue remains unresolved.

Farmers also mentioned the damage done by wild animals to their agricultural fields, stating that monkeys and wild boar invade tea farms, dig up tea tree

Table 2 Interview summary.

Respondents			Nature protection	Economic development
No.	Name, age, gender	Occupation/position		
1	Mr. Z. (40s)	Staff in the Administrative Bureau of the Fujian Wuyishan National Nature Reserve		Ecotourism in the core area has had a negative impact on vulnerable resources. After tourists had been guided to see wild daylilies, the number of flowers sharply decreased in accordance with exposure to tourists.
2	Ms. D. (30s)	Staff in the Administrative Bureau of the Fujian Wuyishan NNR	In 2006, economic loss for farmers caused by wildlife was estimated to be about 1 million RMB. We contacted the Forestry Department of the Fujian Province to inquire whether wild animals are permitted inside the Reserve. However, we received the response that we need to survey the total number of wild animals living inside the Reserve. Consequently, the proposal suggested by the Forestry Department of the Fujian Province is very difficult to implement.	In June 2014, the head of the Administrative Bureau talked about re-opening tourism within the Reserve at an internal meeting. Ecotourism development will benefit nature conservation when local people's incomes increase with new business. Part of the resulting income from the tourism development can be used for facility maintenance in the Reserve.
3	Mr. H. (30s)	Head of the Tongmu Administrative Village, also a black tea trader and designer	We cannot really participate in the policymaking process for conservation of the environment, despite my being the village head.	Tourist industry is necessary for the local economy. However, increasing tourists will cause sanitation and maintenance problems and traffic jams since we only have one narrow road for connecting the villages to the Reserve.
4	Mr. W. (40s)	Staff in the Tongmu Administrative Village		The total number of bamboo trees harvested was 200,000. Usually, a bamboo tree can be harvested after three years' plantation. There are a total number of 3,000 migrant workers each year. Tea harvest season is from April to June. Bamboo harvest season is from July to October. These workers were from the less developed provinces of Jiangxi, Guizhou, Sichuan, Yunnan, and Guangxi.
5	Ms. W. (66)	Villager	There is no longer any illegal logging. Strict protection exists for wild animals, such as monkeys and wild boar. Wild boar will often dig up black tea tree roots. Even the seeds of <i>Torreya grandis</i> Fort. ex Lindl. cv. Merrillii, which has been a traditional local medicine to help digestion in children and old people, are now being eaten by wild boar invading the village.	
6	Mr. P. (50s)	Villager	After the establishment of the Reserve the forest became protected and the water became clean. In the past, illegal logging was a serious problem. New buildings are not permitted. Rebuilding a new one on the same site as an old one requires permission from the Forestry Department of the Fujian Province. The ecological compensation amount is too low.	
7	Ms. H. (54)	Villager		If tourists come, I can consider opening a small restaurant. I enjoy having the chance to talk with tourists. I know that they like local vegetables and fish. I hope that this area can be opened to tourists because, although it will greatly increase our economic income, I will also have a chance to interact with outsiders. My sons and grandchildren are all living outside this area. Only my husband and I are living in such a big house.
8	Mr. F. (60s)	Villager		We used to burn the bamboo into ash and then add water to obtain ash liquid. The bamboo ash liquid is boiled in a big pot and turns into block alkali. We sold the block alkali as an additive for noodle making in the market. Now it is more profitable to cut the bamboo trunk and sell it.
9	Mr. Z. (60s)	Villager		Almost all young people are working in a factory outside of the Reserve. They only come back during the Spring Festival.
10	Mr. Y. (50s)	Villager		The Administrative Bureau is ineffective. They need to improve management such as prohibiting new buildings inside the Reserve.
11	Mr. X. (20s)	Restaurant owner		Tourism development will help my restaurant business a lot.
12	Ms. H. (50s)	Grocery store owner		Tourism development is good for my business. I can sell souvenirs to the tourists.

13	Mr. Z. (60s)	Guesthouse owner	<p>In the past, many trees were cut, now the trees are protected and not cut any more. Protection is good and erosion is much less than in the past. The surroundings have become much better and life is also improved.</p> <p>No reclamation is allowed. The farmland is very tiny and we have to buy most of our vegetables from outside of the Reserve.</p>	
14	Ms. C. (60s)	Guesthouse owner		<p>I don't have many guests since the Reserve is closed to the tourists. The rooms are full only during the holidays such as National Day and Golden Week. In particular, after November, no guests come here. Tourist development will be good for my business.</p> <p>I have five rooms and ten beds in total for the guests.</p>
15	Mr. Y. (30s)	Small tea trader	<p>After being listed a UNESCO Nature Heritage property, we heard that conservation funds were granted, however, the funds did not reach local people. After 2000, with the availability of information, local people started to protest, thus, the compensation fund was given to the locals. At the beginning, the amount was less than 100 RMB, and now the amount has reached about 1,600 RMB/per person.</p> <p>In order to build a more luxurious guesthouse for the VIP to the Reserve, many local, preserved and old trees were cut.</p>	<p>The Administrative Bureau has not taken responsibility for road repairs, for example they did nothing when a landslide happened and the road was damaged after heavy rains during typhoon season. The Bureau did not sent anybody to clear the road and, therefore, local people, themselves, had to clear and repair the damaged road.</p>
16	Mr. X. (50s)	Small tea trader	<p>There are too many wild animals in the mountain. We used to raise chickens inside the mountain forest; however, the chickens were eaten by increasing wild animals. Now we have to raise chickens inside the village. I am from the village of Banshan built on the slope of the mountain, however, almost all of the households moved to the foot of the mountain.</p>	<p>We can sell tea leaves to the tourists if the Reserve were to be opened to tourists.</p>
17	Mr. F. (50s)	Small tea trader		<p>The local economy has worsened since the tourism was banned in the Reserve. The local economy will boost if the tourism industry re-opens.</p> <p>An increase in tourism will cause maintenance and sanitation problems and an increase in forest fire threat.</p>
18	Mr. J. (30s)	Small tea trader	<p>Illegal logging is a big issue. Tree felling has a significant impact on the ecological environment, since it takes several decades, even several centuries for the trees to grow old.</p> <p>There was an old growth grove of fengshui lin close to the guest house of the Administrative Bureau. However, all were clearcut in order to build a more luxurious guesthouse for the VIP. Moreover, the rooms are vacant most of the time.</p>	<p>We can hire some workers to clean the rubbish thrown away by the tourists. It is easy to settle the hygienic problems caused by tourism.</p>
19	Mr. L. (60s)	Large tea trader	<p>After the establishment of the Reserve, three sawmills were closed, the ecological environment became much improved, and the air became cleaner. As a result, the processed tea leaves also improved in quality.</p> <p>A cessation of the tourism industry and ensuing tourist visits does not affect my business very much, since our tea leaves are famous and buyers come directly to the Reserve.</p>	<p>Since our tea leaves sell well, as a result, our home garden that used to produce vegetables was turned into a tea plantation. The tea farm accounted for over 4 ha, and about 40 ton of fresh tea leaves can be harvested and made into approximately 10 ton of dry tea leaves. At the start of the tea harvest season, over 300 migrant workers were hired. Tea harvest workers are all from outside of the Reserve. They come to work from April to June. The tea processing workers are both from the Reserve and from outside.</p>
20	Mr. H. (50s, from the Jiangxi Province, which is West of Fujian)	Migrant worker	<p>The cost of buying vegetables is a big burden.</p>	<p>Employed by the local people to harvest tea, I take care of tea trees and also cut bamboo trees. I am paid 150 RMB/day. Now we rent an old house along the street for 160 RMB/month. My son works in a factory in Zhejiang Province. My old mother lives alone in Jiangxi. My wife is taking care of our grandchildren, since my son is working in a factory in the Zhejiang Province. We only reunite for the Spring Festival in our hometown.</p>

Data source: Field interviews with stakeholders.

Table 3 Benefits and costs perceived by stakeholders under current conservation and tourism policies.

Stakeholders	Nature conservation*		Economic development**	
	Benefits	Costs	Benefits	Costs
The Administrative Bureau of the Fujian Wuyishan NNR	Biodiversity conservation.	Loss and damages from wild boar and monkeys were estimated at over 1 million RMB (equivalent to 150,000 USD)/year.	A share of economic income from the tourism industry can be invested to the infrastructure building and maintenance.	Negative environmental impacts, such as waste water.
Farmers	Obtained payment from ecosystem service.	Wild animals harm the roots of bamboo and tea trees.	Interact with tourists, revenue from specialty sales.	None.
Guesthouse owners	Environment preserved for ecotourists.	New buildings are strictly regulated.	High economic growth expected with tourists coming into the Reserve.	None.
Small tea traders	A healthy ecological environment produces high quality tea leaves resulting in high prices, which are further benefitted from the designation of the nature reserve.	Enlargement of a tea farm is not allowed, thus chemical fertilizers are used to increase productivity.	Increase in sales can be expected with the increasing tourists coming into the Reserve.	None.
Large tea traders	A healthy ecological environment produces high quality tea leaves resulting in high prices, which are further benefitted from the designation of nature reserve.	Due to cutting regulations in the protected forest, it is difficult to secure a firewood supply consisting of <i>Pinus taiwanensis</i> Hayata and <i>Pinus massoniana</i> for high quality black tea production.	None.	None.

Note: *Under the current policy, the natural environment has been greatly improved, however, the locals face the damages from wild animals and strict regulation of economic activities. **Economic development brings income increase for the locals, however, it has negative impacts on the environment.

Data source: Field interviews with the stakeholders.

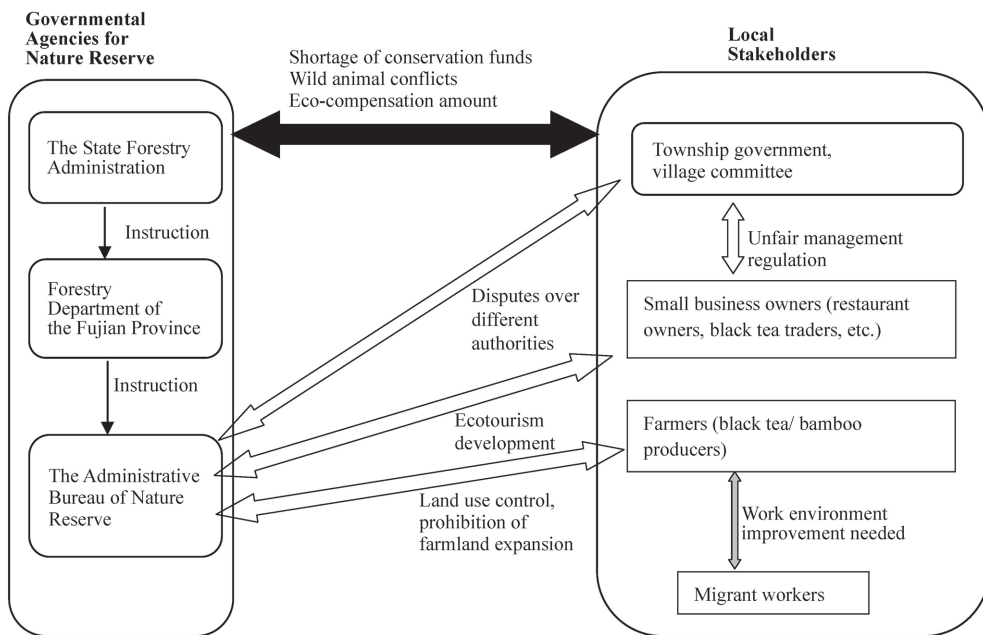


Fig. 2 Conflicts under Current Environmental Protection in the Fujian Wuyishan National Nature Reserve.

Note: \longleftrightarrow , primary conflict; \longleftrightarrow , medium conflict; \longleftrightarrow , minor conflict.

roots and eat the seeds of *Semen Topreyae* (*Torreya grandis* Fort. ex Lindl. cv. Merrillii), which are of high economic value (Ms. W, 60s, Jiangdun Natural Village, Respondent No. 5 in Table 2).

Another issue of concern raised by locals is that the

Administrative Bureau has not taken responsibility for maintaining infrastructure or necessary construction, maintenance, and upkeep of the Reserve. The local people believe that the most of international and national funding that was allocated to the Administrative

Bureau and earmarked for environmental conservation was not properly managed.

Due to shortage in the conservation budget for infrastructure and maintenance, the onus has fallen to local farmers and business owners to ensure responsibilities are being met. For example, the local people had to clear the road when it was blocked by a landslide after the typhoon (Mr. Y, 30s, small tea trader, respondent No. 15 in Table 2). In the summer of 2014, two black tea producers hired workers to repair the road damaged by the flood (Mr. H., 30s, the village head, also a black tea trader and designer, Respondent No. 3 in Table 2).

In contrast to the strict administration of nature protection, several respondents (e.g., Respondent No. 6; No. 15 in Table 2) mentioned that eco-compensation⁽⁵⁾ amounts are low and management of the Administrative Bureau is ineffective. Several respondents (e.g., Mr. Y., Respondent No. 15 in Table 2) reported that the Administrative Bureau only recently started to distribute eco-compensation to residents once the relevant information became accessible online.

2 Conflicts over nature reserve management and administration

Medium-scale conflicts exist among the Administrative Bureau and different local groups: (1) disputes over different authorities with township government and village committee, (2) land use conflicts with farmers, and (3) conflicts with small business owners regarding the prohibition of tourist entry into the Reserve.

Conflicts exist between the Administrative Bureau with township government and village committee in terms of separate management authorities. The township government authorizes land use changes, while the Administrative Bureau manages forest resources and punishes illegal activities that destroy forestland or endanger flora and fauna. Although, transforming the forestland into settlements and enlarging the residential area are prohibited, there are times this prohibition has not been enforced.

Several interviewees objected that local stakeholder concerns have not been taken seriously by the Wuyishan NNR administration. The head of Tongmu Village, Mr. H. (30s, the village head, also a black tea trader and designer, Respondent No. 3 in Table 2), noted that his village committee's concerns were never considered in any of the decision-making processes.

Mr. H. added that local stakeholders have not been given a voice during the processes for designating nature protections. Furthermore, the local stakeholder co-management approach is conducted in a superficial manner; as a result, local stakeholder participation is still at a preliminary stage.

Many respondents referred to land use conflicts with the township government, and forest conservation problems with the Administrative Bureau. Local people complained about the unfair implementation of the regulation, e.g., prohibitions against locals building new residences or expanding existing residences, meanwhile relatives of the government staff may receive permits for new buildings (Mr. Y, 50s, Respondent No. 10 in Table 2).

Similarly, the Administrative Bureau also broke nature protection rules in the Wuyishan NNR. The Administrative Bureau felled all the old pine trees from the *fengshui* forest of Sangang Natural Village, in order to build a more luxurious guesthouse for a central government VIP. While *Fengshui* forests are common in the mountainous area in the villages in the Reserve, these old growth trees had been preserved for hundreds of years for the purpose of ensuring the prosperity of the village people (Mr. J., 30s, Respondent No. 18 in Table 2).

3 Conflicts over ecotourism development

In terms of ecotourism development in the Reserve, conflicts were noted between the Administrative Bureau and business owners. Since 2009, tourists have been prohibited from entering the Reserve, with only a small number of them having entered after lying to the patrol team and saying they came to visit relatives/friends. The village committees and small business owners have made strong appeals to reopen the Reserve to tourists. Not only small business owners, such as those owning grocery stores, restaurants, guesthouses, and black tea traders, but also other residents vehemently support receiving tourists, citing economic benefits as their primary concern.

The respondents noted that more village people could find work opportunities in their hometown when numerous tourists came to the Reserve before 2009, although, some of them did have to go outside of their home to find employment under the regulations regarding tourist entry (Mr. Y. 30s, small black tea trader in Sangang Natural Village, Respondent No. 15 in Table 2).

Moreover, local farmers also expressed their collective desire to start small, tourist-related businesses, should tourists be allowed to enter the Nature Reserve. One respondent would like to open a restaurant where she may increase her opportunity for interacting with tourists (Ms. H., 50s, producer of honey and black tea, Respondent No. 7 in Table 2).

4 High risks for migrant workers

Conflict between local residents and migrant workers can be considered a minor conflict, having a slight influence on nature protection in the Wuyishan NNR. Migrant workers from the provinces of Guizhou, Sichuan, Jiangxi and others, are hired by the Reserve's local people to harvest tea, take care of the tea trees, and also cut bamboo trees. Mr. W. (40s, Respondent No. 4 in Table 2) estimates that seasonal migrant workers outnumber the local population during the tea harvest season, with 3,000 migrants coming to work between April and June. These migrant workers are required to pay for their room and board. However, migrant workers, such as Mr. H. (Respondent No. 20 in Table 2), worry about bad weather affecting work stability and, therefore, income reliability. Another major concern is the high-risk labor environment: since bamboo trees usually grow on steep slopes, workers are always at risk of falling down to the valley.

VI Discussion and conclusions

Under current nature reserve policies, forests, wildlife, and plants are strictly protected and the natural environment has been greatly improved with increased greening. In the Wuyishan NNR, bamboo and black tea production are the principal industries, and the Fujian Wuyishan NNR Administrative Bureau has been supportive of improved bamboo productivity and the rise in black tea prices. As a result, local incomes have also increased. However, these economic activities have a profound influence on the ecosystem and the environment, as the bamboo forest has invaded natural forests, and the use of chemical fertilizers for tea trees has a negative impact on the environment.

There exist several conflicts among the Reserve's stakeholders, and we see these conflicts influence the effectiveness of the Reserve's environmental management and protection, to varying degrees. The major conflict exists between the Administrative Bureau and local stakeholders regarding issues such as a lack of

infrastructure maintenance due to a shortage of conservation funds, low eco-compensation amounts, and human conflict with wildlife. Some medium-scale conflicts exist between the Administrative Bureau and different local stakeholder groups: (1) the township government and the village committee have on-going disputes with different authorities, (2) land use conflicts with farmers, and (3) conflicts with small business owners regarding the prohibition of tourist entry into the Reserve. Furthermore, conflicts between local residents and migrant workers may not always be serious, but they do have an influence on the environmental management of the Reserve. These conflicts can be a destabilizing factor in nature protection because of migrant workers' direct engagement with production activities.

At present, both the Administrative Bureau and the village committees are seeking alternative economic activities because both of the traditional industries are projected to decline in the near future. The increase in the cost of bamboo tree felling and the sudden decline of tea leaf prices has greatly decreased profits. Ecotourism is highly recommended by the local people and even by some local staff at the Wuyishan NNR Administrative Bureau as a viable economic development tool. Careful planning and strict regulations, however, should be taken into consideration to avoid environmental degradation and destruction.

Based on the interviews, the authors suggest that the development of sustainable, community-based ecotourism, even under the present strict regulations implemented by the Administrative Bureau of the Wuyishan NNR, may resolve conflicts between stakeholders.

The Administrative Bureau of the Wuyishan NNR, the village committees, small business owners (of restaurants, inns, and black tea traders), and farmers should be included as stakeholders for conservation policymaking. Similar to other areas in China, the local stakeholders have made local economic development a priority, while the Administrative Bureau prioritizes environmental conservation and biodiversity protection within the Nature Reserve. Stakeholder interests in economic development and nature conservation will greatly influence the efficiency of future policy implementation.

It is also suggested that appropriate eco-compensation can be an effective way to relieve the tension between economic development and environmental conservation in nature reserves. However, it will still take

a long time for farmers to benefit from the eco-compensation system. Recently, local people learned that the Administrative Bureau and the village committee have been using money designated for ecological compensation for other purposes. Until the various stakeholders work together, conflict will continue, which as discussed, will thereby continue to have a negative impact on both economic development and the environmental conservation of the Reserve.

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Notes

- (1) According to "Measures of the Wuyishan NNR Management", which was first formulated in 1990 and revised in 2015 by the Provincial Government of Fujian, the Administrative Bureau of the Wuyishan NNR undertakes the supervision and administration of the protected area, and prevention of forest fires, and forest pest control.
- (2) The forest public security division is under the supervision of the State Forestry Administration and the Ministry of Public Security, and functions as the criminal and administrative law enforcement. It is an important force dedicated to the protection of forest and wildlife resources, and to maintaining social security inside the forest region.
- (3) Tongmu Administrative Village is subordinate to Xingcun Township. The township government undertakes the supervision of local economic development, rural construction, urban housing, land resources, etc.
- (4) A "farmer" in China, is not labeled by his occupation, but by his social status, meaning a person who is "farmer" is registered as a rural citizen. In China, there is a large number of "farmers" who are not engaged with farm work. In this case of the study of the Fujian Wuyishan NNR, the farmers usually refer to those possessing farmland and forestland. According to our field survey, most of the farmers were not engaged with the management of tea farms or bamboo forests.
- (5) Eco-compensation in China, similar to "Payment for Ecosystem Services, PES," is a measure to protect the environment. Logging bans have been imposed in the Reserve, and thus the farmers receive compensation from the municipal, provincial, and national governments to ensure stewardship in conserving the forest. The total amount of eco-compensation paid to the local people in the Wuyishan NNR was approximately 45 USD/ha/year in 2014.

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