The assessment of community-based national forest-trail management in Taiwan

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Abstract

On account of the reduction of manpower in Taiwan government agencies, community-based national forest-trail management has become an urgent and important issue in recent years. Many activities such as trail management and maintenance had been transferred to community residents who live next to the trails. This study tried to evaluate the challenges and effects of community-based national forest trail management at four famous forest trails in I-Lan County, Taiwan. The results showed that the degree of public participation decreased year by year due to the lack of funding and manpower. Short term government subsidies increase the effectiveness of trail operation, but it is not continuous and steady. This phenomenon has seriously affected the long-term development of national forest-trail management. For this reason, many communities suggested that charging the user fees might be a viable option for sustainability. We believe the community participation and public interests in trail management could be enhanced by increasing financial resources and pursuing local development initiatives at the community level. [Keywords: community-based management, national forest-trail, community participation, user fees].

Introduction

In Taiwan, national forests are an important natural and social resource. The high diversity of natural landscapes including geomorphology and ecology allows for various human practices, and creates abundant ecological resources. In the past 100 years, deforestation was the only way to use forest resources, but for now, the current forestry management concept of the Forestry Bureau in Taiwan has been changed from traditional timber production to resource conservation and sustainable development. Since 1990, a series of adjustments on laws and policies related to forest ecosystem management are the best examples (i.e., Tree planting action in flat area, Land-rent for forestation, Prohibition of national forest logging).

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Besides, national forest areas in Taiwan also contain abundant tourism resources. Therefore, the promotion of eco-tourism is now another new strategy of the Taiwan government.

The past 15~20 years, people in Taiwan have increasingly placed a high value on leisure time and recreation due to the increase of national holidays and five-day work week. The convenient highway traffic has also shortened the travel time from metro cities to mountainous regions. People can easily get to almost all mountain villages by driving in a day. For this reason, the national forest administrators of Taiwan built many public forest trails located in mountainous national forests and national parks for recreation. Besides, many communities near the trails also put human and financial resources on eco-tourism promotion and community empowerment on account of significant potential benefits from tourism. In order to build a strong relationship between governors and local communities, since 2003, the Forestry Bureau in Taiwan developed a continuous grant program called "Community Forestry" for encouraging people to join activities such as eco-tourism promotion, community development, forest trail monitoring, and environmental protection. In previous studies, community forestry was defined as "participation of residents in forestry conservation" (Gitelson et al. 2005; Gibson et al., 2000; Padwick et al. 2010; Pathak and Dikshit 2010; Schuster, Förster, and Kleinschmit 2012). USDA (1997) also defined it as "seeking best interests and benefits for a community with forest management methods." As for Taiwan, the main philosophy of the "Community Forestry" program is to frame or conserve the green environment of a community by means of planting trees, recovering green landscape with the support of government subsidies, time inputs of civil servants, and manpower of local communities. The program emphasizes public participation and unity of community residents. The amount of the subsidy is about 10 thousand to 67 thousand dollars per case. It's a good idea for fostering public-private cooperation and local participation in the beginning stages; local knowledge and historical traditions could also be involved in eco-tourism efforts. However, the program encountered a serious problem in the past 5~7 years owing to the new policy minimizing the funding and scale of government. The Forestry Bureau in Taiwan has constructed hundreds of national forest-trails, but now, administrators or managers do not have sufficient capability and budget to monitor the landscape and maintain the trails, and people in communities also cannot afford losing these valuable ecotourism resources. With limited help from the government, it seems community-based national forest-trail management would be a viable option for solving this problem.

Community-based national forest-trail management is highly related to the organization and characteristics of communities. Rist and Humphrey (2010) & Barr, Dekker, and Fafchamps (2015) defined community-based organizations as groups with clear rules, regulations, and power to gather people together for common interests. They can build a strong connection between residents for dealing with some local issues. Agrawal and Gibson (1999) noted that individuals or groups within a community are involved not only in day-to-day operations and collection of resources, but also in the decision making process.

As for the effects of the community organization function, Ostrom (1990) thought most individuals affected by operational rules can participate in modifying them, but the means by which a community of citizens can organize to solve problems associated with institutional supply, commitment, and monitoring remains a theoretical puzzle. Rubin and Rubin (1992) also argued that community-based organizations can lead people to solve common problems and to increase decision-making capabilities or not, and they found every single person plays an important role in community operations. Everyone has equal rights to share the costs and benefits, that is why most community organizations determined public affairs through democratic ways and work together in their best interest to solve common problems. According to this train of thought, participation acts as an indicator of soundness of the degree of civilization of a community or society, including resource assessment and allocation (Willeke, 1974).

Generally speaking, the degree of participation of a single person can be divided into non-intervention, partial involvement, and full participation (Arnstein, 1969). The level of involvement and willingness of community organizations can also be divided into: 1) "Ideal Community" with a stable structure of participants; 2) "Temporary Community" with nonpermanent groups; 3) "Fragmented Community" with lower cohesion of residents. No matter what kind of community, participatory processes in community-based activities will encounter many complex issues such as the lack of resources and information, arguments and conflicts of interest. In the short term, external resources or consultants may quickly solve the problem inside the organization, but in the long run a loss of power and autonomy may occur (LaPalombara, 2001).

In this study, each community has different circumstances, cultural customs, tribes and locations; the probability of implementation and success rates of community-based management is supposed to be different. For this reason, we tried to evaluate the challenges and effects of community-based national forest trail management.

Study area

In this study, the four most popular national forest trails located in I-Lan County of northern Taiwan were selected as study sites (A. Ju-Liaw-Shi natural Trail (Trail A); B. Song-Low national Trail (Trail B); C. Lin-May Trail (Trail C); D. Shih-Liaw Trail (Trail D)). The main characteristics of these four trails exhibited significant variation, and all are located near main communities and villages. These villages and communities can be broadly divided into " Atayal indigenous people" (communities near Trail A and B)/ "Han Chinese people (communities near Trail C and D)". The industrial patterns of Atayal indigenous people are personal grocer's business, traditional farming and tourism related activities. On the contrary, most Han Chinese people near Trail C and D have large areas of land with scale production agriculture and home stay.
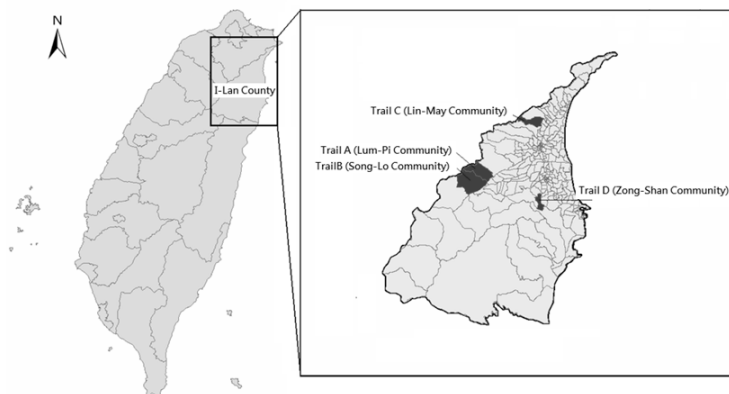

Figure 1. Four national forest trails and the nearby communities

Materials and methods

This study began by collecting previous related studies, records, and reports of the four trails, including basic characteristics, environmental monitoring records, public participation records, resource surveying reports, and documents detailing community organization and structure.

We applied three different methods to investigate the trail conditions and evaluate the opinions of local residents. In order to understand the status of community development, the management of national forest trails, the willingness of community participation, and the financial status of community organizations, the first step of the research process was to conduct in-depth interviews including local residents,

chairmen of communities, and administrators of local NGO's. An in-person questionnaire surveying local residents was also conducted from August 4 to October 27, 2014. A total of 107 (a response rate of 85.6%) participants returned a completed questionnaire. The contents of the questionnaire focused on personal feelings and opinions about community-based trail management, degree of personal involvement, perceived environmental and economic impact of eco-tourism, and expectations for the future. The quantitative results could enhance the analysis derived from in-depth interviews.

In the final stage, we gathered data in four communities near the national forest trails about the possibility and capability of participation in trail management without government funding. If the community can provide services and share the load, the Forest Bureau in Taiwan will effectively reduce the amount of dedicated workload and human resources.

Results and discussion

Quantitative use of Likert data was used to measure differences between the four communities. As for the questionnaire survey results on environmental cleanliness and trail maintenance (Table 1), the average value of interviewee satisfaction was greater than 3.00 (maximum satisfaction score of 5) for each of these two categories. It meant people living in the four communities were satisfied with the natural landscape and facilities of the nearby trails, and the maintenance of trails was considered appropriate by governors and local residents. According to the records of in-depth interviews, good environment also meant that local residents would put higher emotional attachment on trails. They will want to protect them and use them more. Trails A, B and D got a somewhat poorer grade due to the impacts of landslides and debris flows triggered by Typhoon Parma in 2009, but basically, the environmental commitment of local residents was above average.

Table 1 - Environmental awareness survey results
(Questionnaire was divided into 5 levels: 5- very satisfied (very high);
4- satisfied (high); 3- ok; 2- dissatisfied(low); 1- very dissatisfied(very low)

Community Location	Near Trail A	Near Trail B	Near Trail C	Near Trail D
The total number of questionnaires (Questionnaires / invalid questionnaires / refused to be interviewed)	26 22/1/3	30 25/3/2	35 32/2/1	34 28/4/2
question / results	Average / standard deviation	Average / standard deviation	Average / standard deviation	Average / standard deviation
The overall ecological health of trail	3.8 / 0.62	3.9 / 0.63	4.2 / 0.52	4.1 / 0.56
The environmental cleanliness of community and trail	3.5 / 0.64	3.7 / 0.61	4.2 / 0.52	3.6 / 0.64
The growing number of visitors in the last few years	3.1 / 0.48	4.0 / 0.56	4.0 / 0.50	2.2 / 0.49
Nearly three years of industrial development and additional income of your community	2.8 / 0.76	3.6 / 0.74	3.2 / 0.53	3.2 / 0.55
The overall living environment in your community	3.5 / 0.67	3.8 / 0.64	3.9 / 0.56	4.1 / 0.50
The adequate operation of local community associations or organizations	3.2 / 0.76	3.4 / 0.66	4.0 / 0.58	4.0 / 0.48
The involvement or degree of participation of local residents	2.5 / 0.65	3.6 / 0.71	4.2 / 0.70	4.0 / 0.56
The relationship between natural trail eco-tourism and local economy	3.8 / 0.67	3.1 / 0.65	2.0 / 0.53	3.6 / 0.70

Table 1 also showed the number of visitors declined in Trails A and D in the last few years, but increased in Trails B and C. The reason is Trails A and D were seriously damaged when Typhoon Parma came in 2009 and parts of the trail collapsed. Although most facilities were restored by the Forest Bureau in Taiwan, many visitors changed their behavior and went to Trails B and C alternatively, so the number of

visitors in trails A and D went down since 2009. It's obvious that the number of visitors also indirectly affected the economic development and income of local people. For this reason, most people living in these communities agreed trail management and environmental monitoring is very important, but an unexpected finding was that the decrease of visitors and tourism income would not only significantly decrease public participation on community issues but also impact the unity of the community. Local people reported having to find another way to earn money if the tourism income decreased, but they also thought that the trails are not beneficial to them, and that there's nothing they can do about the trail management, especially in indigenous communities (communities near trails A & B) due to their economically disadvantaged character and employment diversification of their society. Most people felt helpless to change the current situation. However, not all of the communities or villages were expressing this concern, especially in ethnic Chinese communities. For example, there was a strong community development association and farmers' alliance in Lin-May Community (near Trail C) and Zong-Shan Community (near Trail D), and most people showed great passion in participating in interpretation services and environmental cleaning. We found that even if the trail location is a little bit far from the community, people living there thought the trail is an important part of their daily life. It is not only for business and sightseeing purposes, but also highly related to the quality of living environment and land value. Besides, many Chinese people who lived here have their own farm lands and deeper pockets. Personally, they did not need to conduct charitable activities for special purposes such as earning tourism income. That is why most Han Chinese people are still very active in supporting government thought that the development of trails C and D apparently had nothing to do with the local economy, which includes activities such as the sales of agricultural products. From this point, we can see the occupation and income of local residents greatly affected their ability and willingness to participate.

Table 2 - Survey results for the management conditions of natural trails

(Questionnaire was divided into 5 levels: 5- very satisfied (very high); 4- satisfied (high); 3- ok; 2- dissatisfied(low); 1- very dissatisfied(very low)

Community Location	Near Trail A	Near Trail B	Near Trail C	Near Trail D
The total number of questionnaires (Questionnaires / invalid questionnaires / refused to be interviewed)	26 22/1/3	30 25/3/2	35 32/2/1	34 28/4/2
question / results	Average / standard deviation	Average / standard deviation	Average / standard deviation	Average / standard deviation
Do you think the current management of national forest trails is good?	3.8 / 0.62	3.2 / 0.64	3.8 / 0.56	3.7 / 0.52
Do you think the current management of national forest trails is irreplaceable?	3.8 / 0.61	2.9 / 0.81	3.5 / 0.75	3.2 / 0.85
Do you think community-based management is a better way?	2.7 / 0.49	2.2 / 0.51	3.1 / 0.55	2.8 / 0.50
Do you have the willingness to participate in community-based management?	2.9 / 0.57	2.8 / 0.78	3.5 / 0.67	3.5 / 0.71
Do you think the guidance or subsidies from the government are necessary?	4.0 / 0.54	3.9 / 0.59	4.0 / 0.57	4.1 / 0.53
Do you think people in your community currently have enough technical capability to join the management of nature trails (including equipment, knowledge, etc.)?	2.2 / 0.56	2.5 / 0.61	3.2 / 0.63	3.1 / 0.65
Do you think people in your community currently have enough financial capability to join the management of nature trails (including equipment, manpower, etc.)?	1.9 / 0.50	1.8 / 0.52	2.8 / 0.51	2.6 / 0.52
Do you agree with the user charges mechanism? (approved / total number of questionnaires)	87.5%	90.9%	88.2%	78.2%
If agree, reasonable range of fees (dollars)?	0.5 to 1	0.5 to 1	0.75 to 1	0.5 to 1

As for the opinions on trail management, we found all respondents

indicated that administrators paid sufficient attention to trail management and environmental monitoring (Table 7-2). However, if we ask local residents to replace the current administrators and share the workload, few people want to participate in community-based trail management, especially in the communities composed by indigenous tribes. There were many reasons that affected their willingness to participate such as: 1) technical and financial gap between governors and local residents; 2) differences in management style and habits; 3) volunteers came from communities with insufficient resources to support long-term management endeavors; 4) the turnover of community members or leaders caused the management plan to be discontinued or interrupted; 5) struggles and conflict of interests in communities; 6) conflict of interests between indigenous people and governors (In most traditional regions of indigenous tribes, there was an imposition of a national government and transfer of forest lands, so many indigenous people feel the government is forcibly occupying their land). Due to unstable community participation, many local residents did not have strong confidence or willingness in promoting autonomous trails management. After on-site interviews, we found most residents preferred to be followers, not leaders, especially when state-owned lands and public affairs were involved. For example, even when many residents in the Lin-May Community (near Trail C) and Zong-Shan Community (near Trail D) were very well off and had higher willingness to join community-based management efforts, they still looked forward to receiving government counseling and subsidies continuously, especially in some communities that never received significant aid and support from the "Community Forestry Plan". Respondents indicated that the self-financing capability was the most important point that influenced the possibility of self-reliance. Over 90% of the residents approved the proposal to build a user charges mechanism so that visitors need to pay for entering the trail, and the ticket prices would fluctuate between 0.5 ~ 1 US dollars. The ticket sales could be very useful to subsidize a community full-time employee, hire trail cleaners or buy insurance for tourists, but according to the current forest law in Taiwan, private collection fees are not be allowed within the area of national forests. In other words, under current law, people of these communities need to find another way to mobilize financial resources, and it's a great burden for them.

From the research results, we found that the Taiwan governors face a serious dilemma given that both indigenous and Chinese communities did not have enough capacity or responsibility to take over forest trail management tasks. For indigenous people, they disagreed with the

command-and-control policies of national forests and their traditional regions, and inadequate personal capacity was also a main limitation. As for Han Chinese people, they did not want to use their own private money in public utilities and affairs, so they emphasized that all public management tasks should be the responsibility of governors, affirming the public role as one of assistance.

This study also investigated some important items or indicators of concern to local residents (Table 3). The statistical results showed key indicators are related to the condition of trail facilities and services such as pavement maintenance, public toilets cleanliness, trail cleanliness, and total number of visitors. Local residents thought there are too many recreation areas and leisure parks in Taiwan, and if they want to attract visitors, a clean and convenient recreation place is the best advertising and main selling point. On the contrary, local residents pay less attention to plant and ecological landscape of trails. They thought the government will take good care of all the plants and wild animals around trails by using government funding, and the residents who wanted to aid in conservation or restoration efforts felt they did not have enough capabilities to do so. This contrasts with the fact that government agencies seem to be most concerned with the environmental monitoring and management. If they want to transfer management tasks and let communities take over, the work content may be beyond the capacity of local residents. This study found volunteers often patrol around their communities in the early morning and take a cursory glance at the trails once a day. The frequency was nonscheduled. It seems impossible to change the life habits of local residents. For this reason, a simple but useful compromise for trail management is needed. The governors have to make a concession if they want the local residents to share the load.

Table 3 – Survey results for the importance of management indicators

Community Location	Near Trail A 26 22/1/3		Near Trail B 30 25/3/2		Near Trail C 35 32/2/1		Near Trail D 34 28/4/2	
Indicator	Number of people	Percentage	Number of people	Percentage	Number of people	Percentage	Number of people	Percentage
Ecological Health	12	37.50%	8	36.36%	13	52.00%	12	42.86%
Environmental cleanliness	19	59.38%	15	68.18%	15	60.00%	14	50.00%
Water Quality	23	71.88%	16	72.73%	13	52.00%	15	53.57%
Vegetation & plant coverage or growth	8	25.00%	7	31.82%	8	32.00%	9	32.14%
Trail pavement maintenance	20	62.50%	16	72.73%	15	60.00%	15	53.57%
Hazard monitoring	20	62.50%	12	54.55%	13	52.00%	13	46.43%
Number of visitors	28	87.50%	15	68.18%	19	76.00%	19	67.86%
Interpretation Services	16	50.00%	15	68.18%	11	44.00%	13	46.43%
Public toilets cleanliness	25	78.13%	18	81.82%	16	64.00%	18	64.29%
Visitor safety	19	59.38%	7	31.82%	10	40.00%	10	35.71%
Parking lots	10	31.25%	6	27.27%	7	28.00%	9	32.14%
Climate forecast	5	15.63%	3	13.64%	4	16.00%	2	7.14%
Air Quality	1	3.13%	2	9.09%	0	0.00%	1	3.57%

The total number of questionnaires (Questionnaires / invalid questionnaires / refused to be interviewed)

In order to increase the willingness to participate in community-based management of forest trails, the Taiwan government promoted many kinds of activities to combine eco-tourism and community affairs. Considering indigenous communities as an example, the ecotourism around trails would be combined with the indigenous festivals, living habitats and products for sale. This can be seen as a means of attracting visitors and resources to the region, but indigenous people did not wholeheartedly support it. The government also encouraged any kind of participation such as: 1) labor input; 2) financial sponsorship; and 3) participation in planning and cooperation with scholars or experts. We found labor input was the most feasible term for participation, and the work content was mainly environmental cleaning, patrol and maintenance. Economically disadvantaged indigenous people would prefer this option rather than financial sponsorship. As for few rich people, due to the better average income and education level, sponsorship and participation in planning would be preferred.

Hamdi and Goethert (1997) reviewed many cases of community management and classified the degree of local involvement into: 1) no participation; 2) indirect participation; 3) consultative; 4) shared control; and 5) full control. The governors have full control power in degrees 1&2, and partly or fully release power in degree 3, 4&5. In this study, we found that the management of four national forest trails was much like degree 4. The government managed large-scale environmental aspects of trails such as ecological health, plant growth and trail maintenance; and the local residents cared about the cleanliness, number of visitors, and interpretation services. It revealed two important things: 1) local residents have less capability or interest to manage, decide and involve the environmental issues that the governors really cared about; 2) local residents lacked the resources or capabilities to take over the full workload of trail maintenance and monitoring, so they only did what they could do. These two reasons help explain the large gap between the government and community agendas. In other words, if we want to increase participation of local residents to "full control", local communities have to get more resources, funding, and technology.

This study also found that participatory processes, conflict management, and decentralization were also main points that impacted the probability of success and implementation rates of community-based forest trail management. The Chinese communities in this study showed better implementation rates than indigenous communities due to well organized associations, common interests, and better community-government relationships. The indigenous people have a

more intense sense of ownership, and their environmental concepts are different from those of the Forestry Bureau in Taiwan, so it would be much more difficult to take over the management tasks at this stage.

Overall, most residents considered that a stable leadership and funding resources are key points of long-term management, and user fees would be a suitable solution for financing national forest trails at the national and local levels. Taiwan government is now trying to amend the law to allow fee collection at national forest trails, but some details still must be settled. We believed that a good system for earning and sharing eco-tourism benefits to communities will attract more participants.

Conclusions

In this study, four communities surrounding national forest trails were included in this assessment and evaluation of the capability for trail monitoring and management. The main conclusions can be summarized as follows: 1) both the Taiwan government and local communities fell into financial difficulties; 2) government and local residents identified the important management issues or interests quite differently, especially between indigenous people and governors; 3) the involvement or participation of local residents was significantly different between Chinese and indigenous communities due to a divergence in concepts and capability; 4) the community-based management potential of local residents was not yet realized; 5) government subsidies were still needed for large area trail management, the capability of community-based management was limited; 6) The user charges mechanism seemed inevitable to resolve the issue of financial instability. We believe that community participation and public interest in trail management could be enhanced by increasing availability of financial resources and pursuing local development initiatives at the community level.

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