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Conservation of forest resources in the area of Chiang Mai Province

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ABSTRACT

The objectives of this research are 1) to study the level of forest resource conservation, forest resource conservation policy, knowledge, attitudes, forest resource management, and enhancement of proactive competence of the organizations, and 2) to study the influence of forest resource conservation policy, knowledge, attitudes, forest resource management, and enhancement of proactive competence of the organizations on the forest resource conservation. The research results reveal that 1) the forest resource conservation, forest resource conservation policy, knowledge, attitudes, forest resource management, and enhancement of proactive competence of the organizations are at the high level and 2) the forest resource management has the total influence on the forest resource conservation the most, followed by the enhancement of proactive competence of the organizations, knowledge, attitude, and forest resource conservation policy, respectively.

Keywords
conservation, forest resources, forest preservation

Introduction

The forest resources are remarkably related to other natural resources and the environment. The changes in forest areas will affect other resources in several ways such as changes in wildlife habitats which continually affect the situation of biodiversity. This means the diversity of plant species and animal breeds including the absorption of water in the upstream forest area and the problem of landslide. In Chiang Mai Province, there are several types of forests including evergreen forest, dry evergreen forest, mixed deciduous forest, deciduous dipterocarp forest, deciduous dipterocarp forest mixed with pine forest and deciduous forest, etc. The forest areas consist of natural forest, forest plantation, and natural restoration forest. The forest area in Chiang Mai Province covers 12,222,265.87 rai calculated as 88.72% of the entire area of the province. There is the downward trend from the past. The declination of forest areas can be caused by various reasons including from the land use, commercial logging, and government policies focusing on economic development such as the granting of logging concessions, the construction of various infrastructures, and the occurrence of forest fire. According to the information of forest areas and changes in each year of Chiang Mai Province, in 2010, the area covered 9,865,737.50 rai or calculated as 71.62 %. In 2019, the area covered 9,627,355.98 or calculated as 69.59% (Provincial Development Strategy and Information Division, Chiang Mai Provincial Office, 2017).

In northern region and central region, there is flood incident. Because of the terrain of Thailand, the important river route from Chiang Mai goes towards the central region. Even though the government has a policy to focus on dam and weir construction, it cannot stop the loss of life and properties of people. It results in the government action to be only able to solve problems in the middle or the end of the cause. The cause of the problem which is the reduction of forest areas in Thailand is overlooked especially the "Chiang Mai forest area" that is an important forest area of Thailand. It originates the water that flows into the central region allowing people to benefit many things such as in agriculture. At the same time, if the amount of forest decreases, it can cause damage. The examples of flood occurring in Thailand are the obvious evidences to prove this. The declination of forest areas can be caused by several reasons.

Therefore, the government agencies implement the projects and activities for developing the forest areas in all forms and encouraging the participation of people in the forest area conservation and protection based on the philosophy of sufficiency economy. This is for beginning to solve the problem at the root in order to achieve the balance between utilization and conservation.

Therefore, the rate of resource utilization should be at a level that the resources can be renewed in time. This will help the resources remain for use sustainably. It also includes the protection of resources which are likely to increase rapidly to be at the appropriate level in order to have renewable resources for sustainable use. However, previously, there was a lack of participation of people in the area. They thought that the protection of forest areas and conservation were the duties of the government officials. If people get involved, they may suffer and become hostile to the influential groups that will invade the area. In the past, the operation of government officials has caused many complaints in benefiting the capitalist groups, the non-responsiveness of community activities in the forest area conservation. The offense often falls on people in the area.

Research's objectives

The objectives of this research are 1) to study the level of forest resource conservation, forest resource conservation policy, knowledge, attitudes, forest resource management, and enhancement of proactive competence of the organizations, and 2) to study the influence of forest resource conservation policy, knowledge, attitudes, forest resource management, and enhancement of proactive competence of the organizations on the forest resource conservation.

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Literature Review

Nature-based forest management principles

Forests are very essential for human living and the sustenance of various environments and other living things. From the loss of forest resources in every part of the world or in Thailand, all parties are aware of the loss and the consequences of such action.

As a solution to this problem, the forest conservation can be achieved through various processes or alternative methods such as the formulation of national forest policy. There are a number of key areas of the national forest policy. It is important to have at least 4 0 % of the total area of the country for being the forests for conservation, forests for economy, National Park, Wildlife Sanctuary, Forest Park, Non-hunting Areas, Botanical Garden, Arboretum, Biosphere Reserve, World Heritage, Watershed Class 1, Conservation Mangrove Forest, and Natural Conservation Areas.

According to the principles of natural forest management, it can be concluded that forests are essential for human sustenance. A variety of methods are required in order to be successful including policy formulation of various types of forest management for having at least 40% of the forest area. Regarding the forest conservation, the forest must be divided into the forest conservation, watershed forest, national park, wildlife sanctuary, and economic forests. The forest restoration is needed along with the forest fire control, forest fire forest fire extinguishing including forest utilization to the maximum benefits for the villagers to live with the forest dependably. There should also be the communication and public relations to educate all parties to be aware of the problem of deforestation and understand the principles of forest conservation.

From the above meaning, concept and theory, the forest resource conservation in Chiang Mai area means the smart use of forest resources in Chiang Mai Province for using the least, the most economical, and long-lasting. It must also be the least wasted and the least damage to the environment. On the contrary, the benefits must be distributed to the public thoroughly as well as maintaining the forests in Chiang Mai Province by taking care of, replanting, and preventing the deforestation. In order to perform the action following the nature of ecosystem, it must consist of (1) setting rules and regulations, (2) creating conservation of forests with consciousness, and (3) creating ecological balance.

Thatchaphong Yanyong (2017) studied the enhancement of process for public participation in watershed forest conservation and restoration in Nan Province and it was found that 1) for the policies and processes for conservation and restoration of watershed forests in Nan Province, the government has the comprehensive forest preservation policy and strategy. The implementation of policies emphasizes the community participation. The scope of work is planned and the law is strictly enforced under the policy of "reviving the forest towards sustainable development". There is a work plan according to the royal initiatives. The project to build Nan livable city in the watershed forest is an agenda of Nan Province. This is conducted along with the establishment of a watershed forest restoration center and restoration control base allowing the officials to work on the base of rehabilitation operations to focus on raising the public awareness of the importance of conservation and restoration of watershed forests. Currently, the survey is done in holding the areas to prevent invasion of natural resources and environment. It can promote economic creation through the proper use of natural resources such as the government sector to train villagers in the area, to educate villagers, and to encourage the communities to participate in forest plantation activities. 2) The process of people participation is promoted for the conservation and restoration of watershed forests in Nan Province consisting of 6 processes; 2.1 Provision of information, 2.2 Exposure to public opinion, 2.3 Consultation and creation of network for collaboration between the public and private sectors, 2.4 Joint planning for the coordination with communities, 2.5 Collaboration, 2.6 Joining to monitor and investigate. 3) Regarding the guidelines for people participation in conservation and restoration of watershed forests in Nan Province, the understanding must be made with people to know the benefits of forests and coexistence with the forests. The emphasis is on people living with the forests happily and sustainably. The process of building knowledge from the existing resource base in the community is emphasized to approach knowledge management that happens to promote and develop appropriate careers in accordance with Royal Initiative Projects. This will not affect natural resources and the environment, find the career that would allow people to live harmoniously with the forest, and generate income to support the family.

Meechai Wongub and Teevisit Munngamkul (2015) studied the guidelines for the conservation of forest resources of the people in the local administrative organization, Wang Chao District, Tak Province. It was found that 1) the conservation of forest resources of the people in the entire level of the local administrative organization, Wang Chao District, Tak Province, was at a high level. When being considered individually, it was found that the conservation of forest resources was at a high level in 3 areas; afforestation, caring for the forests, and forest fire prevention. For the mean at the moderate level, there is 1 aspect which is forest protection. 2) For the guidelines of forest resource conservation development of the people in the area of the local government organization of Wang Chao District, Tak Province, it was found that in the forest protection, the arable land should be allocated for people. Reforestation is required to replace the forestation in degraded forest areas. This can replace and restore the damaged forest and forest preservation. There should be support for community leaders and local people to take part in conservation and preservation of forests in the area from being destroyed and forest fire prevention. There is the demand for the replacement of forest planted in degraded forest areas. To replace and restore damaged forests, there are 4 aspects; (1) forest protection and conservation. The local government organization should ask for cooperation with the Royal Forest Department to issue an arable land right document to the people so that people can have their own arable land. (2)

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In regards to reforestation, there should be replanting in degraded forests to replace and restore the damaged forest. (3) For forest preservation, community leaders and local people should be encouraged to take part in the conservation of forests in the area from being destroyed. (4) For the forest fire prevention, knowledge should be disseminated and publicized to the public about forest protection, forest fire prevention, and making of fire protection lines

Greenpeace (2019) discussed the forest protection, afforestation, and forest conservation with consciousness. For over 10 years, Greenpeace has been trying to make the palm oil industry more responsible for its own production. Greenpeace revealed that big brands like Nestlé, Unilever and Mars use palm oil from those deforested. Thanks to global calls, many brands have pledged to phase out the use of palm oil from palm oil producers by deforestation by 2020. However, the time is almost over and the companies need to do more for keeping their promises. The big brands need to audit their palm oil suppliers and should only purchase from responsible growers, not from those destroying the forests or taking advantage of the local people. Pressure from Greenpeace supporters has prompted Wilmar, the world's largest palm oil trader, to announce plans, maps and checks on palm oil suppliers. If Wilmar can do as they say, it will result in other traders to be forced to do the same and that will make palm oil producers by destroying forests have no one to sell to.

Forest Sector Advisory Services (2019) mentioned the sustainable ecological balance raising Canada as the best example of sustainable forest management with the forest accounting for 10% of the world's forests. The government has worked to ensure the sustainability of forests for nearly 30 years. The country is a global leader in sustainable forests although forest products are Canada's top export economy. The Department of Forestry generates $20 billion annually for Canada but only 1% of the country's total forest is used.

Research methodology

This research used the quantitative method on 300 members of the forest resource conservation group in Chiang Mai Province. The sample size was determined using the criteria of 20 times the observation variable (Kline, 2005). Multi-step sampling was used and the data was collected from the questionnaires through the content validity test with the IOC values from 0.60-1.00. The reliability coefficient (Cronbach's alpha coefficient) of the observed variables used in this research was between 0.732 and 0.915 entirely of 0.982. This was analyzed by descriptive statistics and structural equation models.

Table 1 Sample size

Forest area		Population (person)	Number of sample (persons)
1.	Mae On District	70	49
2.	Chiang Dao District	120	83
3.	Chom Thong District	120	83
4.	Doi Saket District	50	36
5.	San Sai District	70	49
Total		**430**	**300**

Research results

1. The forest resource conservation, forest resource conservation policy, knowledge, attitudes, forest resource management, and enhancement of proactive competence of the organizations were at the high level as shown in Table 2.

Table 2 Degrees of the studied variables

Descriptions	Mean	Standard Deviation	Interpretation
Forest resource conservation	4.30	0.47	Much
Forest resource conservation policy	4.33	0.41	Much
knowledge, attitudes, and forest conservation	4.39	0.43	Much
Forest resource management	4.28	0.40	Much
Enhancement of proactive competence of the organizations	4.36	0.41	Much

2. For the results of model analysis, when considering overall, it was found that the index examined the consistency between the model and the empirical data (Diamantopoulos & Siguaw, 2000). All passed the criteria including (1) relative Chi-square (Chi-square/df) equaling to 1.993, (2) root mean square error of approximation (RMSEA) equaling to 0.058, (3) standardized root mean square residual: SRMR) equaling to 0.026, (4) goodness of fit index (GFI) equaling to 0.94, (5) adjusted goodness of fit index (AGFI) equaling to 0.90, (6) comparative fit index (CFI) equaling to 0.99, (7) parsimony goodness-of-fit (PGFI) equaling to 0.59, and (7) Critical N (CN) equaling to 216.13.

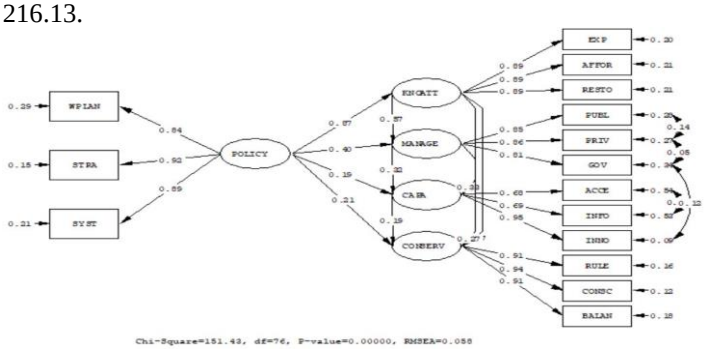

Figure 1 Forest Resource Conservation Model in Chiang Mai Province Area (standardized)

Factors affecting the forest resource conservation in the Chiang Mai area

From Table 3, it was found that forest resource management had the greatest influence on the forest resource conservation followed by the enhancement of proactive competence of the organizations, forest conservation, and forest resource conservation policy, respectively. When considering only the factors directly affecting the forest resource conservation, it was found that forest resource management had the most direct influence on forest resource conservation followed by the enhancement of proactive competence. Meanwhile, the forest resource conservation policy, knowledge, attitudes and forest conservation indirectly influenced the forest resource conservation.

Table 3 Direct influence, indirect influence, and total influence

Influence of Variables	Causal relationship		
	Direct	Indirect	Total
Forest resource conservation policy	0.21	0.11*	0.11*
Knowledge, attitudes and forest conservation	0.27	0.15*	0.15*
Forest resource management	0.27**	0.06*	0.33*
Enhancement of proactive competence	0.19*	-	0.19*

Discussion of results

1. The forest resource management is the most important variable that has direct effect and indirect effect on the forest resource conservation in the area of Chiang Mai Province. This is because the management can be successful depending on the management using local wisdom, having strong leaders, having the organizations in forest conservation, and having forest replacement activity. The participation from all sectors is required including the public sector, private sector and people in finding problems, making decisions, managing, and participating in the evaluation of results. The research results are consistent with the results of Suwit Wannasri, Chukiat Phonkaew, Rungnapa Ruangrote (2012), and Jakkapong Puangngamchuen (2009).
2. The enhancement of proactive competence has the direct influence and the total influence as the second most important to the forest resource conservation in the Chiang Mai area. That the forest conservation operation process in Chiang Mai Province at the agency level, the organization level, the community level, and the individual level has been effective can increase the potential in performance, planning, and working in a systematic manner to reach better achievement of goals. It also includes being prepared to solve problems and prevent risks both in access to legal protection and complete forest resource information system together with the innovation to develop the forest potential. The results of the study are consistent with the research of Rorwiya Sodeng, et al (2017).
3. The knowledge, attitudes, and forest conservation have indirect influence on the conservation of forest resources in the Chiang Mai area due to the insufficient knowledge or attitudes towards forest conservation in Chiang Mai Province. Having knowledge of forest resource dynamics, knowledge in the restoration of damaged and degraded forest resources, knowledge in the strategies to promote, stimulate and instill awareness in the community are the knowledge which must go through a good management process. Thus, these result in the conservation of forests in the Chiang Mai area. The findings are consistent with the findings of Saksri Suebsing, et al. (2018). It is also consistent with the research of Fischetti (2019).
4. The forest resource conservation policy has indirect influence on forest resource conservation in Chiang Mai area. The forest resource conservation programs and projects, strategic plans, design and planning of sustainable forest resource management system cannot be achieved without good forest resource management. Therefore, when the action plan and forest resource conservation project or strategic plan can lead to practice in the Chiang Mai area with the plans, projects, and activities according to the context of the area. There are budgets, orientation, responsibilities as well as the development of suitable manpower along with having the effective management. This is consistent with the research of Somchai Photrakul (2015) and the research of Phornthep Sorathanathorn (2013).

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