

AN ANALYSIS OF LAND USE CHANGE AT THE PERI-PROTECTED AREA: A CASE STUDY OF PHU KRADUENG NATIONAL PARK AND SURROUNDING AREAS DURING 1952 – 2016

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ABSTRACT

Land use change reflects human's needs. Human gain materials for food, clothes, energy, and space for recreation or tourism. Changing land involved with the shift to a different use such as forest land to agricultural land or tourist destination or an intensification of the existing one such as in-season rice field to off-season rice field. Protected areas with the unique landscape are becoming tourist destinations. Protected areas often depend on surrounding area to maintain flows of organisms, water, nutrients, and energy. Hence, understanding in the pattern of land use change in the peri-protected area is crucial with regarding human activities and needs. Land use change in this studied were assessed by using Geographic Information System covering 1952, 2002, and 2016. The peri-protected area in this study covering Phu Kradueng National Park and surrounding areas. Among all land use type, forest land had been the most dominating land use type both in the first period (1952 - 2002) and the second period (2002 - 2016) of the study. However, the forest land decreasing in the first period due to the changing land to an agricultural land and water body. It is interesting that, during the second period, there was a decrease in agricultural land while an increase in forest land even though rising just a small percentage. Besides, the rate of change in land use was relatively slow.

Keywords- Land use change, Peri-Protected area, Phu Kradueng National Park

1. INTRODUCTION

Land use reflects human's needs. Human has the most severe potential impact on the ecosystems. Human can either destroy ecosystems or be able to build new ecosystems which are called cultural ecosystems or land utilization types. In the cultural ecosystem, the human gain materials for food, clothes, energy, and space for recreation or tourism. Other than the usability, the protection and conservation of natural ecosystems through nature reserves is seen as a popular kind of land use. It is reflecting not only human needs but also human responsibilities [1]. The term 'land-use' means the human occupied of the land which included settlement, cultivation, pasture, rangeland, recreation and land use for tourism purposes as well. Changing of land-used involved with the shift to a different use or an intensification of the existing one [2]. Tourism industry as a driver of growth for the global economy, it is promoted at every geographical level. The expansion of tourism land coverage also includes the conversion of traditional land uses such as farming to mixed or entirely tourism-oriented uses [3]. Protected areas with unique landscape are becoming tourist destinations. Land use is also changing from the forest to recreation, tourism and, services purposes. Many National parks have faced the tension from the tourism activities and local communities near the parks. Moreover, not only the

visitors interested in the National park but also the investors. Therefore, well understanding in the pattern of land use change in the peri-protected area is essential.

2. OBJECTIVE

Explore the land use patterns and land use change at the peri-protected area before and after the National park establishment and tourism destination had emerged.

3. METHODOLOGY

The effect of conservation policy and tourism policy on local land use pattern and change in place over a period of 60 years were evaluated to identify how land-use patterns changed. Phu Kradueng National Park (PKNP) and surrounding areas has been selected as study area to illustrate the understanding of the pattern of land use change. PKNP is located at 16° 49' to 16° 59' northern latitude and from 101° 41' to 101° 5' eastern longitude, at an elevation is between 400-1,200 metres with the summit point of 1,316 metres at Khok Moei. It is a part of Sritan Sub-district Phu Kradueng District Loei Province, which is in the northeast of Thailand [4]. PKNP is the second National Park in Thailand since 1961. It is becoming a nature-based tourist destination since the tourism policy emerges in the country due to the National Action Plan for Ecotourism in 2001. According to its high elevation and climatic condition, the weather on the mountaintop is cold all year round. Sometimes, in the winter season, the temperature may drop to freezing point. So, it is the most achievement to visitors who would like to be the PKNP conqueror at least once in their life due to the difficulty of the hiking trail up to the hilltop.

Data Sources and Analysis

Land use pattern and change in the peri-protected area were assessed by using Geographic Information System [5] covering 1952, 2002, and 2016. The present study used two software for digitization, analysis, and data entering. The first one is QGIS, which is the open source software, for digitization and analysis. The second one is MS Excel for data entering. The primary data source was the aerial map of 1952 from the Royal Thai Survey Department and the land utilization maps of 2002, 2016 from the Land Development Department.

An analysis of rate of land use change refers to the rate of annual change in land use amount in certain area at a certain time [6]. The rate of land use change in the Phu Kradueng National park and surrounding area (peri-protected area) is calculated as follows:

$$K = \frac{U_b - U_a}{U_a} \times \frac{1}{T} \times 100 \quad (1)$$

where K is the dynamic degree of a certain land use type in the study period; U_a and U_b are the amount of a certain land use type at the beginning and end of study, respectively; T is the length of study period, when T is year, the value of K is the rate of annual change in a certain land use type in the study area.

4. FINDINGS

Land use pattern 1952

Only two main categories of land use were seen in this period. Land use patterns included forest land and agricultural land (Table 1). Forest covered 428.40 km² which was 98.87%. Agriculture land covered 4.92 km² which was 1.13% of the total area.

Land use pattern 2002

Three main categories of land use were seen in the study area. Land use patterns included forest land, agricultural land, and built-up area (Table 1). In this period, forest land dominated the other land use types covering 375.24 km² (86.93% of total area).

Land use pattern 2016

Four main categories of land use were seen in the study area. Land use patterns included forest land, agricultural land, built-up area, and water body. In this period, forest land was found to be the dominating land use types covering 376.76 km² (86.95%).

Rate of change from 1952 – 2002 and 2002 – 2016

During 1952 – 2002, there was an increase in agricultural land while a decline in forest land in this period. For during 2002 – 2016, it is interesting that there was a decrease in agricultural land while an increase in forest land even though rising just a small percentage. Moreover, in 2002, there was an increase in built-up area 0.12 % of total area and 1.05 in 2016. The rate of change of the built-up area is 55.08% from 2002 – 2016. The data in 2016 also shown that there was a water body covering 3.91 km² which were 0.90% of total area. The detailed show in Table 1 and Figure 1.

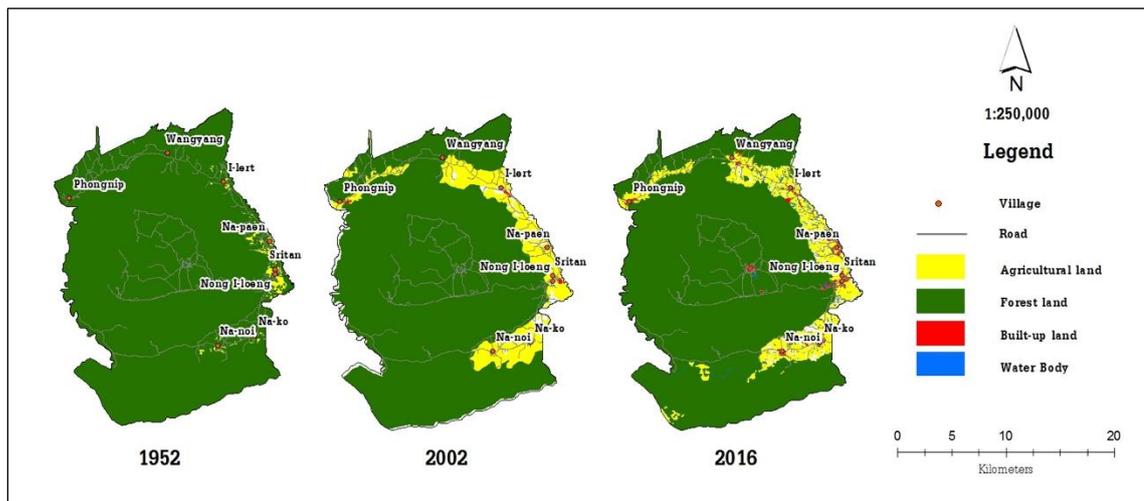


Figure 1. Land use change at the Phu Kradueng National park and surrounding areas

Table 1. The pattern of Land use change at the Phu Kradueng National park and surrounding areas

Land use type	1952		2002		2016		Rate of change (%)	
	Area (sq.Km.)	Proportion (%)	Area (sq.Km.)	Proportion (%)	Area (sq.Km.)	Proportion (%)	1952-2002	2002-2016
Forest land	428.40	98.87	375.24	88.02	376.76	86.95	- 0.25	0.03
Agriculture land	4.92	1.13	50.57	11.86	48.12	11.10	18.60	- 0.35
Built-up area	N/A	N/A	0.52	0.12	4.53	1.05	N/A	55.08
Water body	N/A	N/A	N/A	N/A	3.91	0.90	N/A	N/A
Grand total	433.32	100.00	426.33	100.00	433.32	100.00		

5. CONCLUSIONS

Land use pattern and change in the PKNP and surrounding areas are dynamic. It is classified into four categories, forest land, agricultural land, built-up area, and water body. There has been increasing in agricultural land in the first period and decreasing in the second period due to the changing land to the other type of land use such as built-up area. Among all land use type, forest land had been the most dominating land use type both in the first and second period of the study. However, the forest land decreasing in the first period due to the changing land to an agricultural land and water body. The understanding of the pattern and change in land use in the particular area, especially in the natural areas, may be useful in land use planning and management. It makes a clear picture for the planners and practitioners.

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