

# Oil palm expansion in Amphoe Lam Thap, Krabi province, Thailand

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## Abstract

The aim of this study was to monitor agricultural land use change in Amphoe Lam Thap, Krabi Province between 2000 and 2009 using Geographic Information System, and to examine the change before and after the National Government Policy implementation for massive oil palm expansion with an aim of achieving 10 million rai by 2029. Results show that oil palm areas increased significantly from approximately 20 sq km (12,500 rai) in 2000 to 86 sq km (53,750 rai) in 2009. Its expansion was by a factor of four during the ten-year period of study. Oil palm cultivation has expanded mostly by replacing para rubber plantation area (61.2 sq km ; 71.6%), other agricultures (5.2 sq km.; 5.2%), and forest (3.7 sq km.; 4.3%), respectively. Evidence of strong policy implementation and enforcement was marked in the present study. Strict policy on agricultural land use in this area is essential to maintain healthy environment and ecosystem.

**Keywords:** Oil palm expansion, Land use change, Government policy, GIS

## 1. Introduction

Over the past 30 years, an expansion of oil palm agriculture area has increased by more than 150 percent worldwide for producing food and biofuels (Fairhurst and Mutert, 1999). Malaysia and Indonesia are the two countries responsible for 85% of global palm oil production (Chandran, 2010) with a dramatic drawback of deforestation and endangered species (Carrere, 2006).

In Thailand, development of areas planted with oil palm has been increasing constantly in southern provinces (Colchester et al., 2011) due mainly to suitable climate, geography and soil, particularly in Krabi (Chao, 2009) and Surat Thani (Katib and Wanpiyarat, 2005). Recently, the Thai government has set its policy focusing on additional productions of bio-diesel from oil palm cultivation for supporting the program of promoting renewable energy. Consequently, the Ministry of Agriculture and Cooperatives of Thailand aims to increasing the palm oil plantation area to 10 million rai by 2029 by adding more than 400,000 rai every year (Bandita, 2007).

The objectives of the present study were to monitor oil palm agriculture expansion in Amphoe Lam Thap, Krabi province between 2000 and 2009, a period before and after the policy set up, and to investigate the hypothesis that the expansion was restricted to pre-existing croplands using Geographical Information System (GIS).

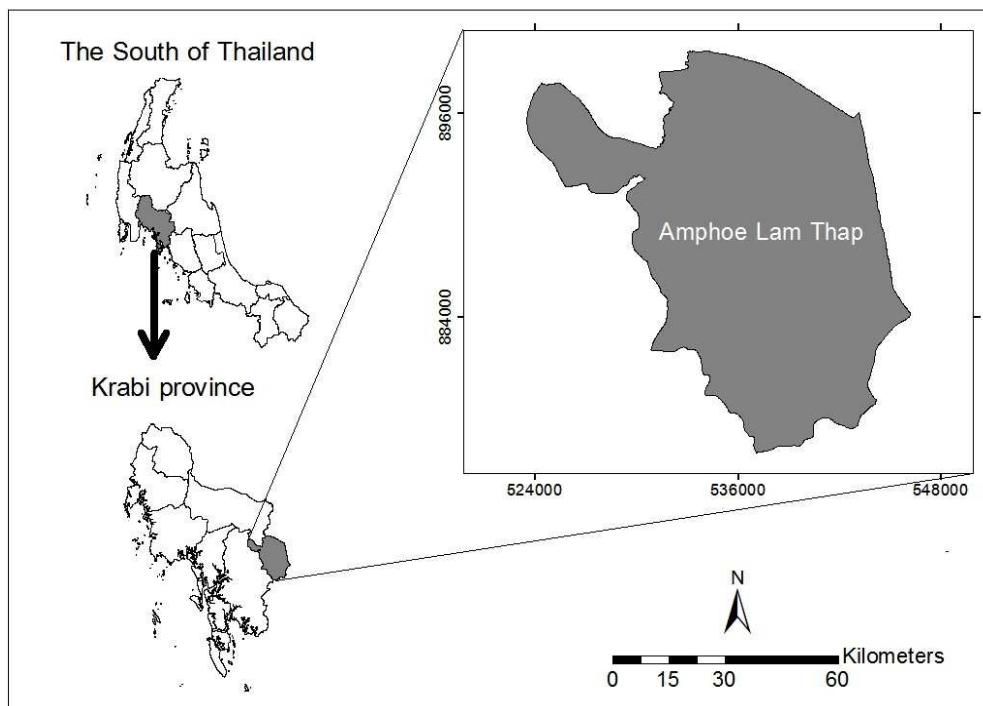
## 2. Methods

### 2.1 Study area

Amphoe Lam Thap is located in Krabi province, southern Thailand (Fig. 1). It covers an area of approximately 287.6 sq km. Its physical geography is mountainous highlands and plains. Population's income relies on agricultures, particularly para rubber and oil palm.

### 2.2 Land use classification

Data on land use map in 2000 and 2009 were obtained from the Land Development Department, Ministry of Agriculture and Cooperatives of Thailand. The land use map in 2000 and 2009 were input the coordinates into land use map in 2000 and 2009 and have all been adjusted to the WGS 1984.



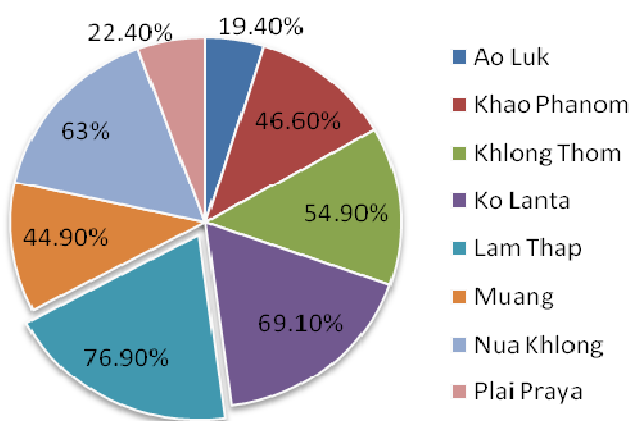
**Figure 1:** Study area of Krabi province, southern Thailand.

The original maps were classified into 3 levels; the first level of five categories, including agriculture, forest, water body, urban and others; the second level of 19 (in 2000) and 21 (in 2009) categories; and the third level of 41 (in 2000) and 50 (in 2009). We reclassified land use types into thirteen categories with a focus on agricultural expansion detection. These categories were oil palm, oil palm and other, para rubber, para rubber and other, paddy, abandoned paddy, shrimp farm, other agricultures, evergreen forest, mangrove, urban area, water body and miscellaneous land. Two time series land use data maps were overlaid using GIS to compare land use changes. The input land use map in 2000 clipped by oil palm in 2009. The attributes of output are the same as those of the features in the feature class being clipped.

### 3. Results

#### 3.1 Land use change in Krabi province

The results of agricultural land use change in Krabi province during 2000-2009 are shown in Table 1. It was found that two types of land use increased significantly; oil palm (688 sq km) and mangrove (358 sq km) whereas para rubber plantation (681 sq km) and forest (360 sq km) decreased dramatically.



**Figure 2:** Rates of oil palm expansion in Krabi province.

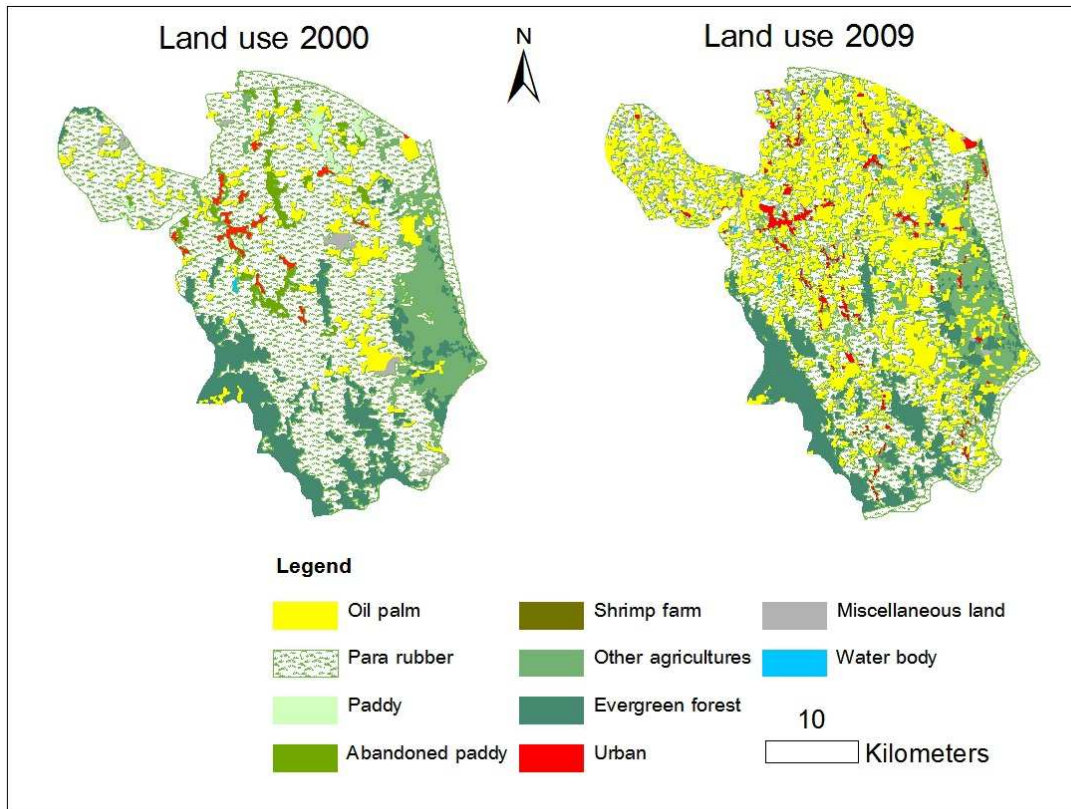
Figure 2 shows the rates of oil palm expansion in the eight Amphoes of Krabi province. The highest expansion rate was found at Amphoe Lam Thap, followed by Amphoe Ko Lanta, Nua Khlong, and Khlong Thom, respectively.

**Table 1:** Land use change in Krabi province between 2000 and 2009.

Land use type	Area (Square kilometers)			
	Year 2000	Year 2009	Diff.	% Diff.
Oil palm	944	1632	688	29.11
Oil palm and other	3	1	-2	.08
Para rubber	2307	1626	-681	28.81
Para rubber and other	19	0	-18	.76
Paddy	67	19	-48	2.03
Abandoned paddy	32	27	-5	.21
Shrimp farm	53	44	-10	.42
Other agricultures	140	83	-57	2.41
Evergreen forest	1092	732	-360	15.23
Mangrove forest	22	379	358	15.15
Urban area	54	105	52	2.2
Water body	70	76	6	.25
Miscellaneous land	15	94	78	3.3
Total	4818	4818	2363	100

#### 3.2 Oil palm expansion in Amphoe Lam Thap

Figure 3 shows agricultural land use change in Amphoe Lam Thap. There were no mixed crops and mangrove forest in this area. Oil palm plantation increased evidently from 20 sq km. (in 2000) to increased 86 sq km. (in 2009) of the total area. This suggests an increase of more than fourfold for the duration of ten years. The expansion has replaced para rubber plantation (61.2 sq km ; 71.6% of the total oil palm area), other agricultures (5.2 sq km.; 5.2%), forest (3.68 sq km.; 4.3%), and abandoned paddy (2.82 sq km.; 5.2%), respectively.



**Figure 3:** Comparisons of land use types in Amphoe Lam Thap, Krabi province, between 2000 and 2009.

#### 4. Discussion

Sustainable agriculture is the practice for balancing human activities and natural ecosystem (Thanwa, 2000). In the past, agricultural development had relied mainly on farmers' accumulated knowledge and experience that passed on from generation to generation. Such development sustains management of natural and environmental resources. These days, the policy-based development has become the major driving force of expanding agricultural land uses, focusing more on economic growth than natural preservation (Thanwa, 2000).

Land uses for agricultures in Thailand have not reduced in size (Thanut, 2008). The lands have been converted from original crops to economic crops. This conversion has been driven by policy and regulation at local, regional, and national levels. Our findings provide a strong evidence of policy-driven

agricultural land conversion. A rapid expansion of oil palm plantation has accelerated the growth of economy in the region. Meanwhile, it has been restricted to pre-existing croplands, particularly para rubber agriculture. This is similar to that has been reported by Usawadee (2006) and Chao et al. (2009).

Unlike in Malaysia and Indonesian, the obvious deforestation has resulted from clearing lowland rainforest for oil palm plantations, subsequently environmental damage and tremendous loss of biodiversity (Fitzherbert et al, 2006; Wicke et al., 2011).

#### 5. Conclusions

The objective of this study was to monitor oil palm agricultural expansion in Amphoe Lam Thap, Krabi province before (in 2000) and after (in 2009) the policy implementation for conversions of pre-existing crop lands to the oil palm expansion. Our study

shows that land use change in this area, at this time, has been conformable with the government policy. Monitoring oil palm expansion in the other areas of Krabi province is also required and deserves a further study. Policy on agricultural land use should be enforced continually and strictly in order to strengthen a balance between policy-driven agricultural development and healthy ecosystem.

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