POLICY ASSESSMENT OF POTENTIAL BIODIESEL FEEDSTOCK SUPPLY IN THAILAND

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SUMMARY: The Thai government has promoted the Renewable and Alternative Energy Development Plan for 25 Percent in 10 Years (AEDP 2012-2021) to reduce the energy importation. In the present study, we aimed to assess the potential development of alternative source for biodiesel sector. A case study of three provinces, Krabi, Suratthani, and Nakornsrithammarat, was considered to seek for suitable areas for oil palm expansion based on the land suitability guided by the Good Agriculture Practice (GAP) of the nation. We emphasized on the AEDP policy implementation for the restriction of expansion only on the pre-existing croplands, mainly the rubber plantation. Our results indicated that only the land availability and suitability in the three provinces are sufficient for oil palm expansion target as far as any ages of rubber plantation are considered. In the future, we propose to investigate the ages of rubber plantation in order that only the old plantation should be considered as suitable oil palm expansion.

Keywords: renewable energy, GIS, land suitability, oil palm, para rubber,

INTRODUCTION

The majority of energy consumption in Thailand depends on the importation. Crude oil has the highest proportion at 80% of total domestic oil consumption, and the value is over 31 billion US dollars. The Thai government has promoted the Renewable and Alternative Energy Development Plan for 25 Percent in 10 Years (AEDP 2012-2021) to reduce the energy importation, and to take opportunity for the future development of low carbon economy and society [1].

Biodiesel is one of the attractive renewable fuel sources in Thailand, and the main feedstock is obtained from palm oil. The AEDP policy production target is set at 5.97 million liters per day by 2021. Such that 880 thousands hectares of oil palm plantation will be required by 2021. In order to regulate this biodiesel alternative, the government has established the protocol-based strategy of oil palm industry (2004-2029) and has set the national development toward energy security as the most significant part of The 11th National Economic and Social Development Plan (2012-2016). Rubber plantation is chosen as the priority croplands in land transformation to oil palm. This is due to the fact that the yield of rubber plantation in Thailand is much more over the world marketing demand. Therefore, the reduction of replanting this plantation is motivated by the government incentives and subsidies to stimulate land use changes from cash crops to energy crops.

With the aim of policy implementation, oil palm expansion is in consideration with land availability and land suitability guided by the Good Agriculture Practice (GAP) of the Thai agriculture handbook on oil palm plantation. Agriculture is complicated in nature because of the large scale and the dynamic of plantation, and thus using GIS can easily and quickly analyze and update information both quantitative and qualitative [2]. The aim of this study was to assess the potential development of alternative source for biodiesel sector. We considered the two largest producers of oil palm fresh fruit branch, Krabi and Surat thani provinces, in order to seek for suitable areas for oil palm expansion based on the land suitability guided by the GAP of the nation. Nakornsrithammarat province was selected as an alternative producer to assess the possibility of oil palm expansion in the future. We emphasized on the AEDP policy implementation for the restriction of expansion only on the pre-existing croplands, mainly the rubber plantation.

MATERIAL AND METHOD

Study area

Krabi, Surat thani and Nakornsrithammarat provinces are situated in southern Thailand. The three provinces cover an area of approximately 2,781 thousand hectares. About 90% of oil palm plantations are located in the south of the country because its climatic and landscape conditions are suitable for the growth. Thus, the Thai government has focused on the expansion of oil palm plantation areas in these areas to maximize yield production.

Geographic Information System

Land use classification in 2012 and land suitability for oil palm growth were obtained from the Land Development Department, Ministry of Agriculture and Cooperatives of Thailand. Before performing the GIS analysis, we reclassified land use types into seven categories with a focus on areas that grow rubber and oil palm plantation. These categories were oil palm, para rubber, other agricultures, forest, water body, urban and bare land. Four categories of land suitability were classified as suitable, marginal, not suitable and unclassified. We

defined the suitable area as an area with the potential of producing high yield, the marginal area with the lower yield, the unsuitable area for very low yield (not worth to invest), and the unclassified area mostly on the steep hill or in the forest.

This GIS analysis was based on a raster analysis. A cell size of 100 meters was chosen to ensure that the smallest area of rubber and oil palm will be discovered. A method of converting polygon features to a raster dataset is based on the maximum combined area for a cell assignment. Finally, a map of rubber plantation that is currently situated on lands that in fact are suitable for oil palm was produced.

RESULTS AND DISCUSSION

Although the series of government regulations on the biodiesel development sector have been strategically planned, the achievement of the policy production target is dependent on all stakeholders in the oil palm industries. When focusing on land requirement, a choice of crop made by the land owners is the most important factor in driving the potential of biodiesel feedstock supply under the land limitation. It is noted that the policies have implemented by encouragement not by enforcement. Therefore, at the regional level, local authorities are key success for policy implementation in practices. They are responsible to convey information on government incentives and subsidies to farmers, where appropriate, encourage them to transform their pre-existing crops to oil palm by taking into consideration of land suitability, educate them with the GAP, and monitor the outcomes using a total area of oil palm expansion and yield production per unit area as succession indicators.

Having said that, a basis of knowing in advance from where is the most suitable to where is not worth to grow oil palm is essential for a farmer encouragement process. Incorrect information may affect farmers' life since oil palm is a monoculture plant with a growth cycle of 25 years. Table 1 shows different land use types in 2012 that are currently situated on lands that are suitable for oil palm growth, and Figure 1 illustrates a map of rubber plantation on the potential areas that could be converted to grow oil palm in the future. A total area of rubber in the study area is approximately two folds of that of oil palm. The majority of the oil palm plantations are located on the suitable and marginal suitable lands. In addition, only the land availability and suitability in the three provinces are sufficient for oil palm expansion target giving that any ages of rubber plantation are considered. In the future, we propose to investigate the ages of rubber plantation in order that only the old plantation should be considered as suitable areas for oil palm expansion. Such information will provide an insight of actual land availability and suitability in consideration with the policy regulations, which in turn, offer a better accuracy of yield estimation.

Table 1. Land suitability of oil palm plantation and its current situation of land cover in 2012 of Krabi, Surat thani and Nakornsrithammarat provinces

Land use	Area (1000 Hectare)			
	Suitable	Marginal	Not suitable	Un-classified
Oil palm	240.4	101.8	52.4	40.2
Para rubber	564.2	119.8	264.7	117.0
Other agricultures	69.1	144.8	57.4	39.8
Forest	30.3	20.1	670.9	15.8
Urban	34.6	36.8	21.9	11.3
Water body	4.2	3.8	10.0	21.1
Others	20.7	40.0	18.3	9.2

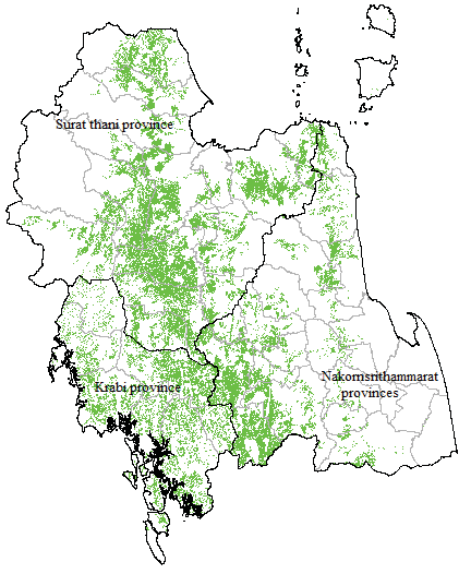

Figure 1. Rubber plantation areas suitable for new oil palm plantation expansion

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