

# The Agricultural Areas Potentials Development for Agro-Tourism Using Geographic Information System

Mattika C. Phandee and Pornpatchara Pinthong

**Abstract**—This paper is analyses of suitable agricultural area's development for agro-tourism and development approach of agricultural areas using geographic information system in Nakhon Ratchasima, Northeastern, Thailand. The technique of map overlay of topography data, agricultural land use data, network analysis and field survey. The agricultural areas that are appropriate in the development of agro-tourism, the agricultural area of the implementation of the new theory or integrated farming as a guideline for the management of land and water for agriculture in a small area to the sustainable. In the area are divided the agricultural and residential areas into four sections based on the ration 30:30:30:10 means that the first area is about 30% of the water resource, rainwater reserve supplement for growing crops in the dry season, as well as aquaculture and crop water. The second area is about 30% of the rice cultivation area to serve as a daily food in the household enough throughout the year to reduce costs and self-reliant. The third area is about 30% of the mixed garden for food and can be sold. The last area is about 10% of the residential areas and other area (stables, vegetable gardens, straw, etc.). The agricultural areas for the development of agro-tourism showed that suitable in the area of agricultural land use mostly in rural areas. Other important factors, as appropriate, the convenient transportation, the supports from the government and taken seriously by farmers.

**Index Terms**—Agriculture, agro-tourism, the new theory, sustainable, geographic information system.

## I. INTRODUCTION

Thailand is a country with full of natural resources which support tourism, arts, cultures, history; the unique attractions of local and foreign tourists. Moreover, the industry's of tourism and revenue of the country have been increased continuously. The importance policy to promote tourism according to a variety of needs is the key to the development of tourism and services. Nowadays travelling around the world has been changed; furthermore, travelers are interested in agro-tourism. The development of the tourism based on the society is a guideline to travel to the engine in the economy and the social development of the country is sustainable. Considering the country's infrastructure was found that two-thirds of the population which is in the agricultural sector and the different characteristics of plants under different farming areas. The characteristics of interested is the potential to develop tourist attractions known as

agro-tourism.

The agro-tourism is travel to the farming community, agricultural plantations, herb garden, livestock farms, and pets and aquaculture. It is included with public institutions and educational institutions with research and technological development of agriculture production. To receive the knowledge and experience based on responsibilities and awareness for the preservation the environment [1].

## II. STUDY AREA

The study area is in Nakhon Ratchasima Province located on the northeastern of Thailand. Geographical coordinates are 14°58' 28" N, 102°5' 53" E. The area consists of 32 districts and cover the whole area 20,493.946 square kilometers. The agricultural land use is approximately 14,211.803 square kilometers [2].



Fig. 1. The study area

## III. MATERIALS AND METHODS

This research study used quantitative data and qualitative information. Ideas documents and research documents from academic research papers and related documents.

The following materials are used in this study:

### A. The Digital Topography Map and Land Use Map

The maps of digital topography used in this research contained different data layers including [3] road/river water body and slope in 2008 of the Land Development Department. The land use map about agricultural land use included with paddy field, field crops, fruit, horticulture and perennial plant in 2011 of the Land Development

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### B. Methods

The agricultural areas suitable of potential development for agro-tourism. Using geographic information system, software ArcGIS 9 ArcMap V.9.2. The technique of map overlay of topography data, agricultural land use data and network analysis [4].

## IV. RESULTS

### A. The Agricultural Areas Potential Development for Agro-Tourism

The topography of Nakhon Ratchasima Province is a high mountain and lowlands. Which can be divided into four areas [5].

- 1) The high mountains to the south of the province, with a height of over 250 meters above sea level in the district area of Pak Chong, Pak Thong Chai, Wang Nam Khiao, Khon Buri and Soeng Sang. The areas are highly sloping, high erosion of soil and the origin of the rivers.
- 2) The middle of the province at an altitude of 200-250 meters above sea level in Sikhio, Dan Khun Thot, Thepharak and Phra Thong Kham, the bottom areas of Sung Noen, Kham Thale So, Mueang Nakhon Ratchasima and Non Thai, the top areas of Pak Thong Chai, Khon Buri, Soeng Sang, Chok Chai, Nong Bun Mak and Chakkarat. Some areas of the lowlands along the river.
- 3) The undulating areas in the north of the province are about 200 meters above sea level in Kham Sakaesaeng, the top areas of Non Thai and Khong, the west of Huai Thalaeng, Chum Phuang, Ban Lueam and Bua Yai. The undulating areas are interspersed with paddy field in Lam Thamencha. Some areas of the riverbank lowlands.
- 4) The north of the province is the lowlands with an elevation of less than 200 meters above sea level in Non Sung, Phimai, Khong, Non Daeng, Sida, Prathai, Mueang Yang, Bua Lai, Bua Yai and Kaeng Sanam Nang. Some areas of the riverbank lowlands.

The agricultural land use of the data was analysed that shown in Fig. 2- Fig. 6 [6]. The paddy field areas are mostly 4,226,319 Rai (6,762.11 square kilometers), the areas in the middle and upper parts of the province. The field crop areas about 3,793,042 Rai (6,068.87 square kilometers), the areas throughout the province. The perennial plant areas about 414,967 Rai (663.95 square kilometers), the area south of the province is a high mountain. The fruit areas about 222,818 Rai (356.51 square kilometers), the areas in south and middle parts of the province. The horticulture areas about 26,608 Rai (42.57 square kilometers), found in the Nakhon Ratchasima District. The results of the data analysis cannot identify the potential area to develop the agro-tourism. The survey found that the area has potential to develop the agro-tourism, the integrate land use, inserted in a rural residential area, near the main roads and secondary roads of the community.

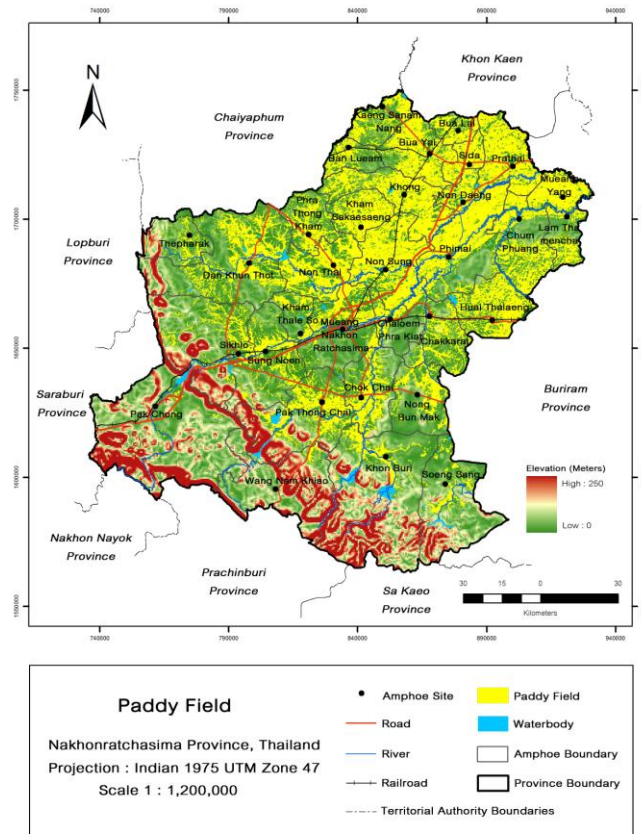


Fig. 2. The paddy field areas

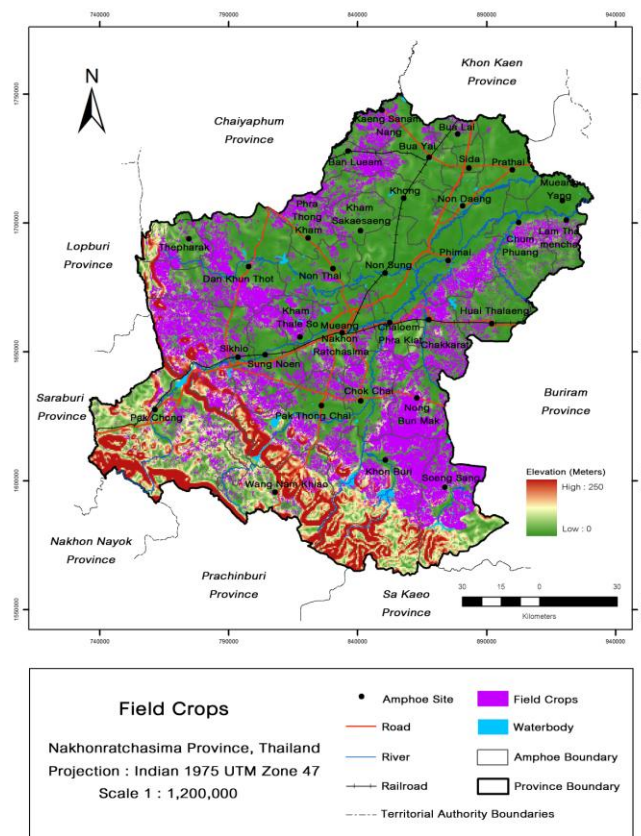


Fig. 3. The field crop areas

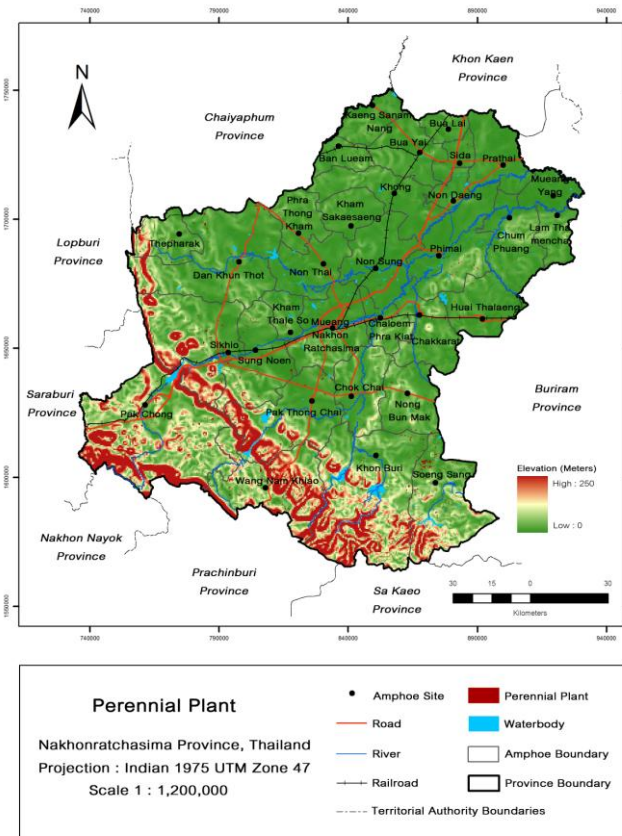


Fig. 4. The perennial plant areas

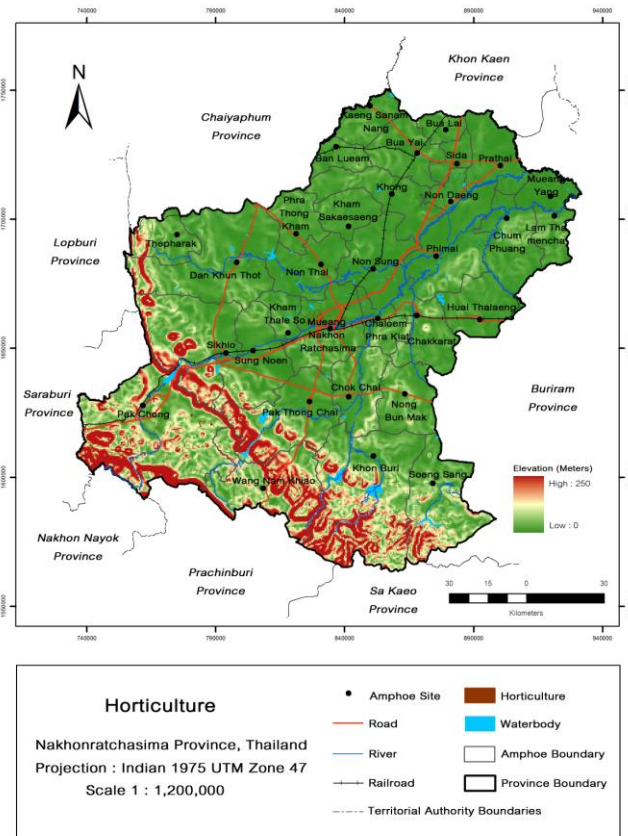


Fig. 6. The horticulture areas

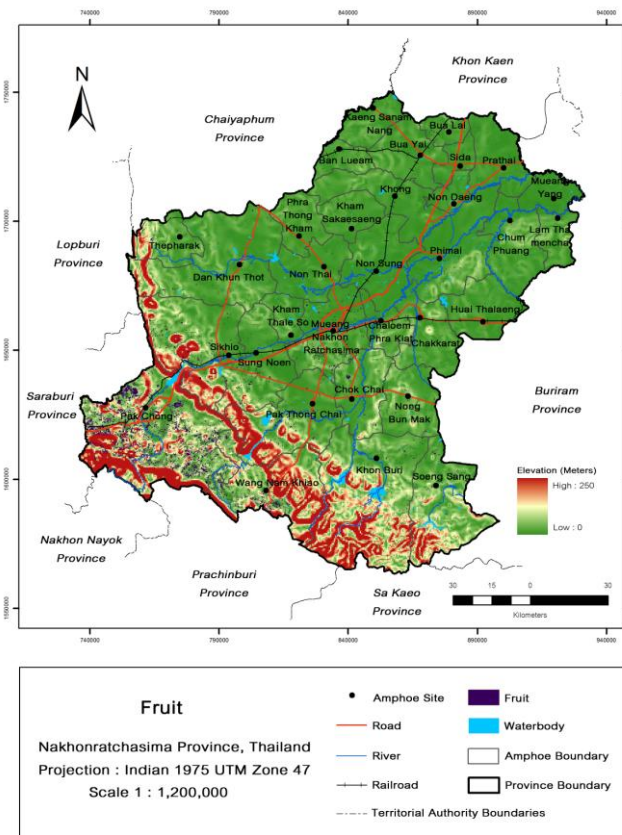


Fig. 5. The fruit areas

### B. The Patterns of Agricultural Area for Agro-Tourism Development

The patterns of agricultural area for agro-tourism development in Nakhon Ratchasima Province. The agricultural area of the implementation of the new theory or integrated farming. The new theory divided into three phases. Phase I the basic: performed in a small area about 15 Rai (6 acres). Divided the agricultural and residential areas. Divided the area into four sections based on the ratio 30:30:30:10 means that the first area is about 30% of the water resource, rainwater reserve. Supplement for growing crops in the dry season. As well as aquaculture and crop water. The second area is about 30% of the rice cultivation area. To serve as a daily food in the household. Enough throughout the year to reduce costs and self-reliant. The third area is about 30% of the mixed garden. For food and can be sold. The last area is about 10% of the residential areas and other areas (stables, vegetable gardens, straw, etc.). In this phase, farmers will bring local wisdom or popular wisdom in agriculture. To improve productivity, resolve the problems. Included is the origin of integrated farming, agricultural self-sufficient, agriculture's contribution to the life and environment shown in Fig. 7 [7].

In any case, the described ratio only serves as a recommended formula or as guidelines. Adjustments of the ration can and should be made to suit each area's local characteristics such as the soil characteristics, the amount of rainfall and the general environment [8].





Fig. 7. The area modification according to the new theory

Phase II the middle: farmers will in the form of a group or a cooperative to execute the following activities [9].

- 1) Production – in this aspect, farmers have to work together in the production. Beginning, crop selection, soil preparation, irrigation system and other factors necessary for cultivation.
- 2) Marketing – must be prepared for various to sell products such as drying rice, rice barn, rice mill and product distribution.
- 3) Well being – farmers also need a good quality of life and the fundamentals of life (shrimp paste, fish sauce, food, clothing, etc.).
- 4) Welfare – each community should have the necessary benefits and services (public health, loan fund, etc.).
- 5) Education – communities should play a role in promoting education (the funds for education).
- 6) Society and Religion – communities should be centred in the psychological and social development. There is a religious bond.

All activities must be cooperation from all parties involved, government agencies, private sector and Communities to be successful.

Phase III. The Advances: Farmers or groups of farmers would then proceed to Phase III which involves making the necessary contacts and coordinating to funding or funding sources (bank, private companies, etc.) to assist in the investment for activities that improve the quality lives.

The benefits of the new theory. Can be divided into [10].

- 1) Can solve the problem of drought.
- 2) More efficient use of farmland.
- 3) Farmers have consumed enough food.
- 4) Farmers have done throughout the year.
- 5) Social declines.
- 6) Can reduce the loss of foreign exchange.
- 7) Country's economic stability.
- 8) Sustainable development.

## V. CONCLUSION

The developed areas of agro-tourism for learning about a person's life in the rural community, development areas from the farmers themselves. A prototype areas of the farmers who have been shortage problem of water for agriculture and affected by the economic crisis. Success as learning centre and dissemination of knowledge to other farmers. Should receive the promote, support and developed by the government. For example: infrastructure, capital, marketplace, cluster, and publicize.

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