

The Spatial Analysis and Land Tenure with Geographic Information System Tool by Participatory Process with People in Moo.6 Ban Don Sak, Chainat Province

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ABSTRACT

The objective of this research was to conduct a spatial analysis of the land conditions and ownership by employing the community participatory process in Ban Don Sak, Huaingu Subdistrict, Hankha District and Chainat Province. This research also used the Geographic Information System as a tool for storing, managing, analyzing and displaying land ownership in form a thematic map. These data provided concrete evidence of the community participatory process and promote application of the technology for decision making regarding the preservation of land in the future. The result of this study revealed that the majority of existing landscape is considered lowland area consisting of the Chin river and total area of approximately 4,048 rai (6.477 square kilometers). In this particular area, agricultural land accounted for 92.63% of the whole area and the habitat land and others accounted for 7.37%. Moreover, the village was located moderately 2-16 meter above sea level, slope was 0-20%. After using spatial analysis to study the landscape conditions along with SWOT and villagers' input, it is clear that the most urgent problem in this area is water management. The villagers discussed about the solutions together based on data obtained from spatial analysis and came up with a local solution. Land ownership in Ban Don Sak revealed that most land owners were from other villages (71.52%). Only 28.48% of the land owners are from Ban Don Sak village (out of this group of land owner 41.67% were real owner while 58.33% were land renter). As a result of this research, the local community has realized the history and the unique cultural condition of the area for future integration. Additionally, the consciousness of local villager can be used to achieve local security by becoming self-reliant.

Keywords

Geographic Information System; Land Tenure; Participatory; Chainat

Introduction

Nowadays, Ban Don Sak villagers face problems in arable land. This is due to the economic problems, agricultural crop prices slump and lack of water resources. Problems related to natural disasters, such as floods, droughts due to rain, no seasonal rainfall, various factors and government policies, have resulted in low productivity in most areas in Thailand. These unpleasant disasters have caused farmers' debt problems and gradual loss of arable land. In addition, arable land is a significant production cost in the farming process. If the villagers have debt, then they might lose these arable land because most farmer sign a lease local businessman.

Therefore, the research team have created a process of participation with the community (PAR), including the application of Geographic Information System (GIS) technology to study the area condition. Community arable land including analysis of the suitability of the area and low altitude conditions Land slope towards agricultural land use for limited land use by collecting, managing, analyzing and displaying data. Both in map format Statistics and reports made aware of land use conditions Land Holdings and the suitability of the area to the land use of Don Sak villagers [3]

A study of land conditions and land tenure through participation with villagers using GIS tools. The participation process is therefore a

guideline for solving the problems of the area sustainably. Villagers can be self-sufficient and they can apply the knowledge gained to the top management in the area to create sustainability in the community

Methodology

The population group used for this research was Ban Don Sak villagers, Moo 6, Huai Ngu Sub-district, Hankha District, Chainat Province. Purposive sampling was used because it was a sample group with special characteristics that satisfy the research objectives. Sample group consisted of 13 people including 5 villager researchers (village headmen, former headman, Chief Assistant, philosopher, Village committee) and 8 villagers (upstream, midstream and downstream groups) who owned arable land in Don Sak village.

Ban Donsak, Moo 6, Huai Ngu Subdistrict, Hankha District, Chainat Province has a total area of approximately 4,048 rai (6.477 square kilometers; area obtained by studying data and analyzing the area condition by GIS). Most of the land use is for agricultural activities, especially rice farming, followed by plantation (pomelo, papaya, vegetable garden).(Figure 1)



Figure 1 Study area

Don Sak village consisted of Tha Chin River flowing through the north, which is the main river

and important water source used in agricultural areas. There is also an irrigation canal running through the western side of the village, which constituted the boundary line between agricultural areas. This area also clearly contained living space and some exploitation of water in the form of shallow wells that villagers have dug to use water for farming in their own area.

This research combines GIS tools with Situational Assessment (SWOT) techniques and participatory practical research (PAR) processes which employed data collection from documented studies, area survey, interview and small group meetings. These techniques included 1. Data collection by using documents about general information, brief history, population, area scope, transport routes, local economy, social and cultural conditions of the village 2. Site condition survey to indicate land usage, land ownership, boundaries of the village, buildings/landmarks, water bodies, transport routes, elevation, slopes, soil data set. The survey was conducted using maps, geospatial technology and unmanned aircraft (Drone) as a tool to create a database of community information. 3. Using the In-depth interviews to study the background and history of the village settlement in detail as well as the current situation. The community context related to the land ownership of Ban Don Sak villagers. 4. Using subgroup meetings and SWOT techniques to analyze weaknesses, strengths, obstacles and opportunities in order to understand the real situation of the current problem. That happened to the villagers including the exchange of knowledge between local researchers and a team of researchers at Chandrakasem Rajabhat University to study the changes that will take place in the village through the lesson transcription process.

The research process consists of 11 steps: 1. Proposition development and research design 2. Meeting to clarify the project 3. Field visit and data collection 4. Analysis, compilation, compiled data 5. Knowledge enhancement 6. Design and experiments 7. Summarization and preliminary

report writing 8. Data return 9. Writing complete research report 10. Research dissemination 11. Utilization (Figure 2). With every step mentioned above, villagers are participating in every step. And share lessons after every activity.

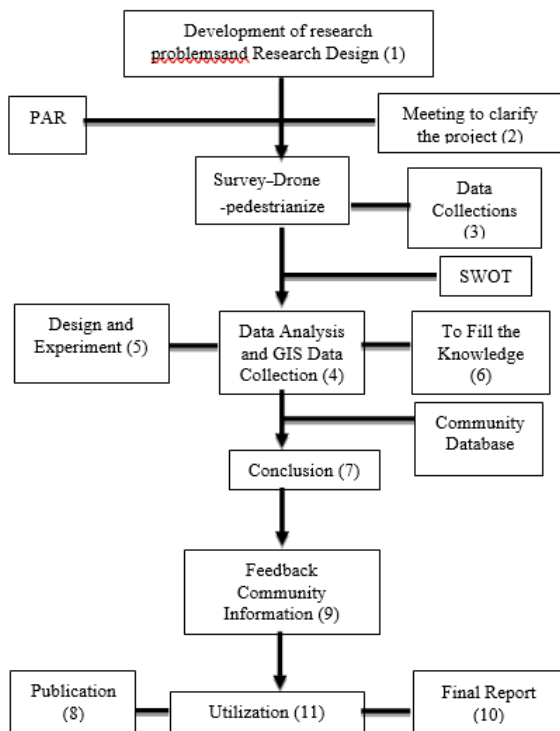


Figure 2 Systematic Diagram of the research process

Results

Analysis results of the Ban Don Sak area, Chainat Province. Don Sak has a total area of 4,048 rai (6.477 square kilometers), with most of the area being agricultural area of 3,750 rai (6 square kilometers) or 92.63 percent of the total area, while residential areas and other areas included 298 rai (0.4768 square kilometer), or 7.37 %.

The study analyzes the area condition using the digital elevation model (DEM) [4], which is a high-level numerical model obtained by surveying altitude or elevation points that are representative of the terrain. It is storing data, processing and modeling virtual three-dimensional (3D) dimensions. And analyze the height - low of the Ban Don Sak area with high

level data (Digital Elevation Model: DEM) appears that Don Sak village It is located 2-16 meters above sea level. (Figure 3)

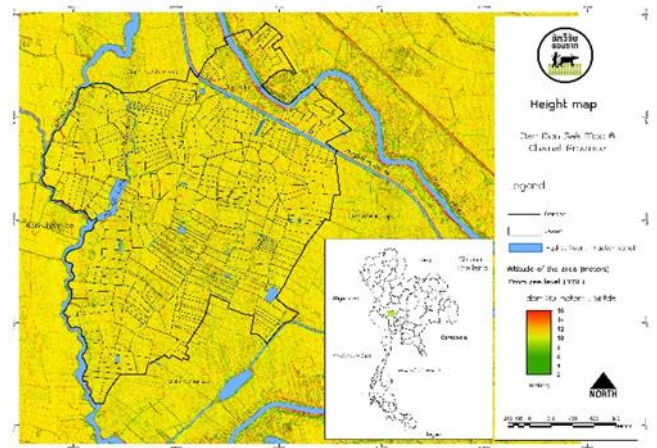


Figure 3 Ban Don Sak Elevation Contour Map

Analysis of high-level data (Digital Elevation Model: DEM) found that Ban Don Sak area have a slope of 0 - 20 percent (Figure 4). The area slope from the northeast and also slope to the southwest.

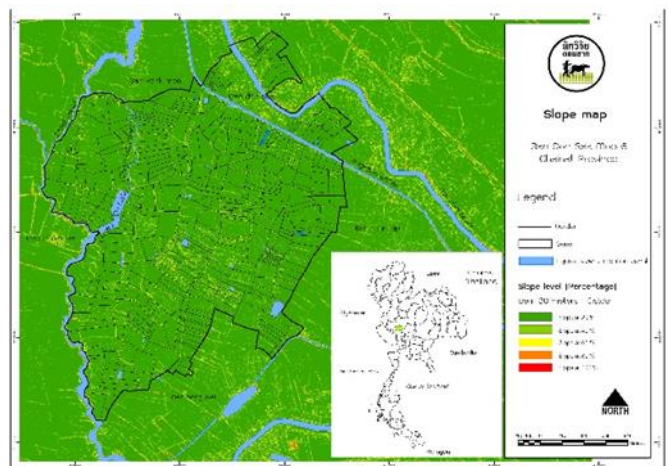


Figure 4 Ban Don Sak slope map

In study area, the research team exchanged and learned about land usage with villagers. Researcher team have used Geographic Information System (GIS) as a tool for studying land ownership and land tenure. Classification of land ownership in Don Sak Village by Land Development Department can be divided into 8 types as shown below in Figure 5.

1. Residential areas: 186 households
2. The area consisted of 1 school, which is Wat Khok Moo School.
3. The area consists of 1 temple, which is Wat Khok Moo.
4. The water source consists of the natural water source, the Tha Chin River and the man-made water source is the village irrigation system.
5. The total amount of rice fields is 3,750 rai (6 square kilometer).
6. Pomelo plantation
7. Mixed farm
8. Grove

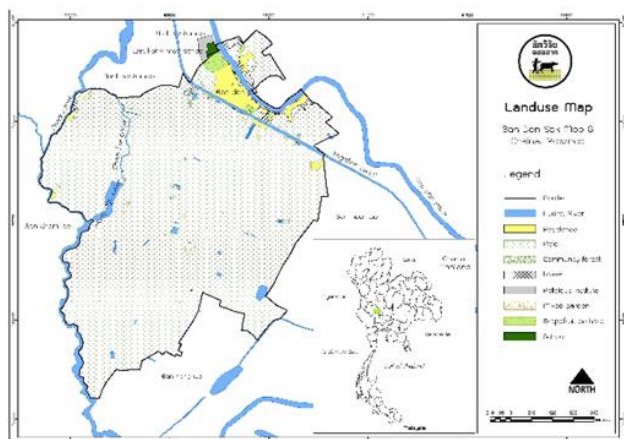


Figure 5 Ban Don Sak land use map

Most of the villagers' agricultural areas are used for farming. The utilization of the area can be divided into 2 types: 1) the utilization of buildings and structures. It consists of residential, commercial, mixed use, religious institutions (temples), educational institutions (schools), animal husbandry. Area, water source, and others 2) land ownership of arable land. Most of the land occupied by Don Sak villagers working in farming

From the study of the above area conditions together with the situation assessment technique (SWOT) together with the villagers' input. It was found that the most urgent problem in the area that the villagers wanted to solve was water management. One of the solutions suggested was the improvement of pump port located in the Tha Chin River and installation of solar water pumps as alternative energy to replace oil usage. Additionally, the researcher shared

about water management in Ban Don Sak area by combining the information obtained from data collection, such as the low altitude, slope and land ownership data for individual plots. During the project, villager, researchers and professors came together to visit the actual site to survey water sources and irrigation systems. This meeting defined the route of the sample area for the management of water canal that the villagers can operate by themselves and create a process of collaboration in water diversion. In addition, the research team has used unmanned aerial vehicle (Drone) technology to help fly the original chicken canal. And set additional line for the filling canal

Therefore, data from the survey and data from the analysis of high-low conditions were used. Area slope with DEM data in combination with arable land ownership data. And information on the land holdings of farmers groups Obtained from the education of the villagers Which is at a similar height is It is 10 -12 meters high above the median sea level and has a slope of 20 percent to determine the canal line. Which is an irrigation system to divert water from the Tha Chin River into agricultural areas in addition to the existing ones to maximize the benefits of water management in the area thoroughly and efficiently (Figure 6).

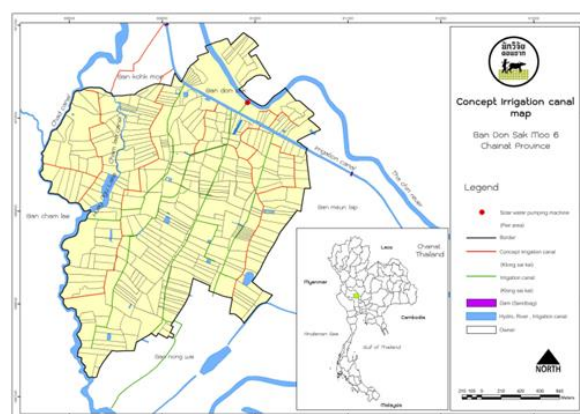


Figure 6 Water management system through participation with villagers

Land ownership at Ban Don Sak, Chanat Province. From the analysis of land ownerships in

Ban Don Sak village using GIS data, it was found that land ownership in Ban Don Sak Village, Moo 6, covered a total 411 plots of land. There are 216 plots of land dedicated for agricultural activities, covering a total area of 1,068 rai (1.7088 square kilometer) or 28.48%. There are 195 plots of farm ownership with a total area of 2,682 rai (4.2912 square kilometer) or 71.52% (Figure 7)

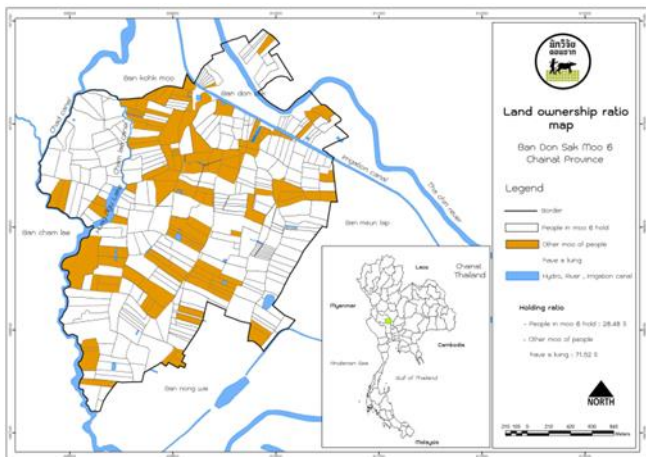


Figure 7 Land ownership ratio at Ban Don Sak

Data gathered from the study on land ownership of Ban Don Sak farmers can be classified into two types as follows: 1.) Complete ownership 2.) Partial ownership through land leasing or financing. It was found that people in the village had their own land which covered an area of 445 rai (0.712 square kilometer) or 41.67% and rented arable land covering 623 rai (0.9968 square kilometer) or 58.33% (Figure 8).

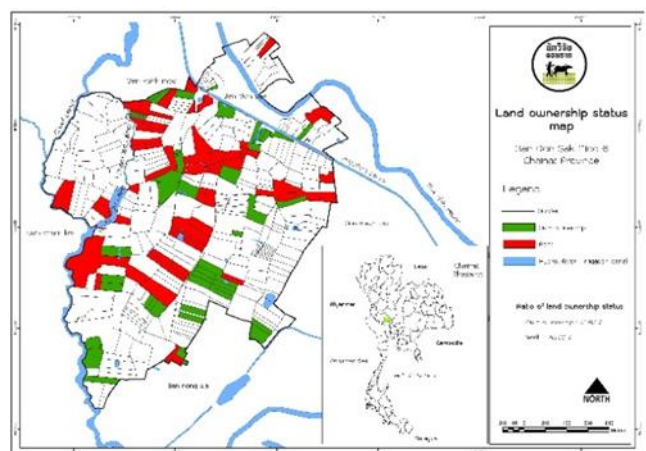


Figure 8 Land ownership status ratio at Ban Don Sak

Data revealed the area of mortgaged land equalled to 359 rai, or 36.98% (Figure 9). Through the participatory technique Ban Don Sak villagers are now aware of land conditions and governance regulations in the area. This research clearly reflected how passionate villager are for their land and the reasons to preserve these arable land for their children, grandchildren and siblings. After data interpretation, it is possible for villager to communicate their needs to show mutual awareness in terms of land ownership.

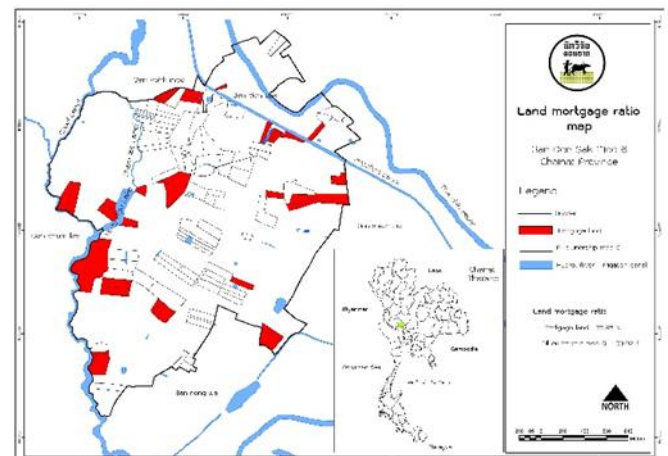


Figure 9 Mortgage ratios

Limitations and Future Studies

The land condition and land ownership data obtained from the study can be developed and used as a data for formulating a master plan for long-term village development through a process of community participation. These methodologies can be either applied in terms of area development by villager or government agencies. In particular, the management of the water area, which is a major natural cost that villager have to pay for developing agricultural areas. In order to solve the problem of water shortage and expense of water management in these agricultural areas. If granted more time it would be important to study about the low altitude area relative to the level of the river. This extended knowledge can support the community water management planning to reduce agricultural cost induced on the villagers.

The process of raising awareness in terms of land ownership can be implemented by

engaging villagers. It is important to collect input from different type of population to cover the whole range of villager in the area. groups. information of Ban Don Sak. By increasing the target group to cover the whole village researcher can obtain an accurate data. The implication of this research would be to reduce the amount of arable land loss in the future

Conclusion

Studying area condition revealed that the Don Sak village is located on the left side of the Tha Chin River basin. Further exploration revealed that the village is located at an altitude of 2-16 meters above sea level, with a slope of 0 - 20%. Don Sak Village has an area of 6.477 square kilometers or 4,048 rai, which is similar to the document posted at the Ban Don Sak Sufficiency Economy Philosophy Learning Center. The characteristic of this area is divided into two parts: housing accounted for 7.37% and agricultural area accounted for 92.63%. Water sources used in agriculture are divided into three categories: The Tha Chin River that flows through the north side of the village. shallow wells excavated by farmers to use in their farms and the existing irrigation system. The conventional method that is used for water management system consisted of pumping station along the Tha Chin river. Narrow channels were dug by the villager to direct water from the river into their private irrigation system for their own plantation. The most important issue is the water management in the area. Farmers have come together to discuss and proposed solutions to problems such as improvements in the Tha Chin River pumping port and installation of solar-powered water pumps. Land ownership ratio whereby the people of Moo 6 hold farms, there are 216 plots of land covering an area of 1,068 rai (1.7088 square kilometer) or 28.48%. There are 195 plots of land that are owned by villager covering an area of 2,682 rai (4.2912 square kilometer) or 71.52%. The reduction in the number of land ownership may be due to both internal factors such as inheritance, family

behavior, and the ability to manage domestic debt. Additionally, there are external factors such as the establishment of agricultural cooperatives in areas that are a major source of loans, government policy, and the development of rice varieties to support market demand, etc.

Based on the results of the study, the irrigation canals (Tha Chin River) diverted water from the Tha Chin River into the agricultural areas of the former villagers, which accounted for 40 percent of the agricultural area. After the process of engaging villagers using Geographic Information System (GIS) technology to analyze the data of elevation and slope together with the display of land ownership data of farmer group. This creates an agreement that is a guideline for the mutual use of water management in agricultural areas, where villagers have jointly established the line along the Ban Kai canal in addition to the original establishment. This area covered the entire area of agricultural land.

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