

## KNOWLEDGE TRIANGLE IN COMMUNITY WATER RESOURCE MANAGEMENT

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### **Abstract:**

Water management at local area level is considered important for stable natural resource management. This study examines the pattern of knowledge transfer among community members, government sectors and educational institutes in respect of local area water management in accordance with royal initiatives in Southern Thailand. These initiatives encompass all dimensions of water management, including local water problems, geography, and the lifestyle and culture of local people. The ultimate goal is to ensure that people will have sufficient water for consumption all year round and that they can be financially self-reliant. The results of the present study indicate that collaboration and knowledge transfer among community, government agencies and universities are the main factors in successful management. The pattern of knowledge transfer is characterized as a knowledge triangle, in which every sector must fully understand the nature of water, access to water, and water-related development. In addition, knowledge must reflect the local situation, including stage of start-up and scale-up. The knowledge triangle can help to increase collaboration across all sectors, based on knowledge and development role.

*Keywords: Knowledge Transfer, Knowledge Triangle, Community Water Resource Management*

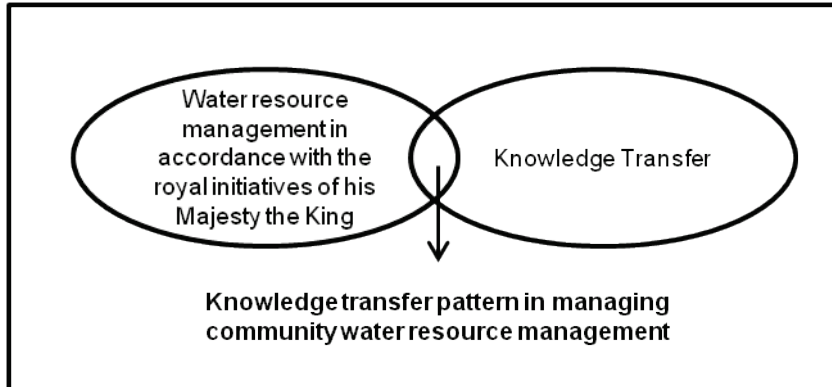
# 1. INTRODUCTION

As agriculture is fundamental to Thailand's economy, the sector's development is considered important for the country's economic growth. This is clearly reflected in royal initiatives involving water resource projects that include identification of water sources, construction of reservoirs, drainage, and treatment of polluted water (Maiklud, 2007). According to the available data, Thailand has sufficient levels of rainfall but relatively few reservoirs. Rainwater that is not appropriately managed will cause many subsequent problems in terms of either flood or drought. This is very obvious in the southern part of the country, which has the highest level of rainfall, and there is always severe flooding (Thai Meteorological Department, 2015; Hydro and Agro Informatics Institute, 2015). The flooding adversely affects agriculture in that region and therefore the country's economy as a whole. As a result, it can be seen that water management is the crucial issue for the economics of the country (Bunclark, et al., 2011). To solve the water problems, the concepts in royal's initiatives projects have been implemented for the stable solution (Sultana, 2009). Nowadays, there are many areas of the country that employ this concept in the area and the results obtained are very successful. However, the water management in the local area of people needs a lot of suggestions and support in many specialised area and the technology. These areas are still in need of knowledge and require the support in knowledge transfer from all relevant sectors so that the water management can be done in accordance with the royal's initiatives project (Hydro and Agro Informatics Institute, 2015). This research is aimed to study the knowledge transfer among the community, government agency, and university in water management under the royal's initiatives projects in the southern area of Thailand so that the water problems can be solved with stability.

## 2. THEORETICAL FOUNDATION

The theoretical approach here is based on water resource management in accordance with the royal initiatives of his Majesty the King and on the principles of knowledge transfer (Figure 1).

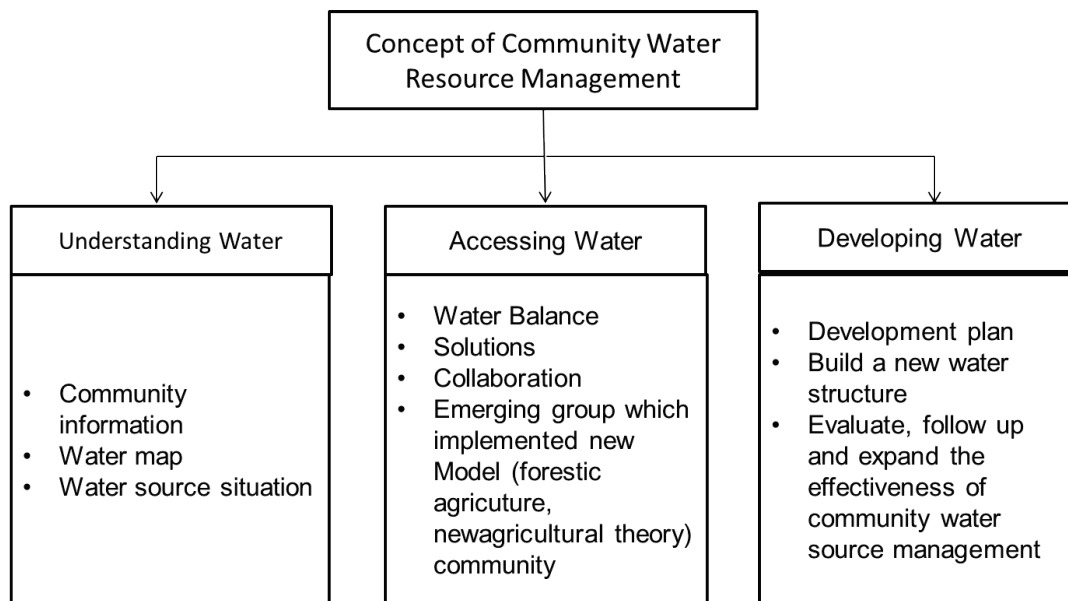
Figure 1: Theoretical Framework



### 2.1. Water Resource Management in Accordance with the Royal Initiatives of his Majesty the King

Under the royal initiatives, water management encompasses all relevant dimensions of the issue (Maiklud, 2007). It includes three main concepts: understanding water, accessing water, and developing water (Hydro and Agro Informatics Institute, 2015) (Figure 2). Local people are encouraged to participate in water management in their own area.

Figure 2: Overview of water resource management.



Source: Hydro and Agro Informatics Institute, 2015

1) Understanding Water: This begins from an overview of all available information and data on water in the local community, including water maps and known water sources, so that all relevant problems and issues can be understood.

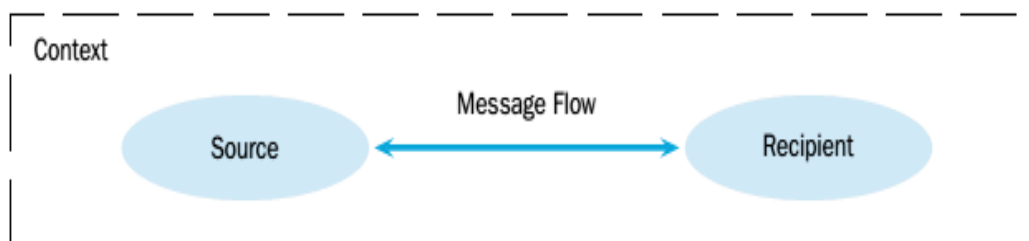
2) Accessing Water: This involves the analysis of solutions to water problems through collaboration of communities, government sectors, and educational institutes. As stated in the royal initiatives, water management must reflect local social, geographic, cultural, and lifestyle factors for successful implementation. In addition, the security of water resources and the careers of local people must be strengthened in two respects. a) Agroforestry: structures must be put in place to prevent the use of the land for nonbeneficial or unfair purposes and to secure people's rights to food, ecological balance, income, and harmony between humans and forest. b) New royal agriculture theory: support for water and land management, construction of reservoirs, and water delivery systems must be planned and processed through local authorities to facilitate change.

3) Developing Water: In implementing the plan in practice, results must be applied to other areas, connecting local people in the planning, follow up, and evaluation of water management.

## 2.2. Knowledge Transfer

Knowledge transfer is the dissemination of knowledge from one party to another who needs that knowledge. This transfer takes the form of a communication, in which a message is sent from sender to receiver (Distanont, 2012) as in Figure 3.

**Figure 3.** Knowledge transfer process.



Source: Distanont, 2012

Knowledge transfer is considered to involve the creation of new knowledge that leads to innovation, or to the better and more effective work results (Distanont et al., 2014; Argote & Ingram, 2000).

### **3. RESEARCH METHODOLOGY**

The present qualitative study is based on a multiple case study approach. The two cases refer to nine communities selected by the Hydro and Agro Informatics Institute for implementation of water management according to royal initiatives. Instruments employed include in-depth interviews, field work, and observation. Content analysis was used to analyse the collected data.

### **4. RESULTS AND DISCUSSIONS**

#### **4.1. Case Studies: Pa Phayom Community and Ban Kuan Community**

The Hydro and Agro Informatics Institute (HAI) is the government agency responsible for local community water resource management project under the royal initiatives. The process focuses on knowledge building and understanding in a collaboration between local people and educational institutes, which provide coaching to ensure optimal results. To ensure continuity and stability throughout the process, the project engages local people in a genuine collaboration with HAI and Thammasat University. The case study communities were selected by HAI as model communities, in which water management under the royal initiatives strengthens existing water resources and solves the problems of flooding and drought in the area. Projects can be up and running successfully within a year. Ban Kuan Community in Yala has collaborated with HAI for many years, and the guidelines for water management in the royal initiatives have been successfully implemented. Since then, water management problems in the area have been solved by people working together. As detailed below, this success has since been extended to other areas.

##### *Pa Phayom Community, Pattalung*

This community is located on the plain of the Pa Phayom Canal (Talay Noi Sea Plain). During the rainy season, this community has always been floods: in summer, there was always drought because all the water courses dried very fast because of the accumulation of surface soil. The water supply was therefore insufficient, especially for agricultural purposes. This affects people's incomes because 80% of the local population work in agricultural activities such as rice and rubber production. When the prices of agricultural products fall, people's incomes are also affected, and people here have no other sideline work. HAI undertook field work in the area and planned the development of local water resources with the people through sub-district management offices and educational institutes. They also transferred knowledge regarding water management in accordance with royal initiatives, connecting all existing water sources and building new reservoirs to store the water from nearby forests. People were taught to manage water more systematically by the use of water maps and technology, enabling them to apply the guidelines for water management to agriculture based on the King's new agriculture theory. In collaborating with the educational institutes they were supported by consultants who made suggestions concerning management and planning. As they came to understand the importance of water management, people became more confident and willing to participate in water management in their own area. All the community leaders, including heads of districts sub-districts and local communities are active in supporting people to collaborate with water management in accordance with royal initiatives.

##### *Ban Kuan, Yala*

In this agricultural community, people are mostly employed in rice planting, rubber tree planting, fruit gardening, and related activities. The area is flooded every year. Based on an understanding of water, the community began to apply the principles of community water source management by drawing a water map and exploring the existing structure of water in the area. In this process, they employed technology such as satellite and GPS images to analyse the direction of water flow, drawing a water map and linking information about the topography of the area to existing water status. They then planned for the improvement of water direction in case of high water levels, as well as planning for water management in case of periods of water shortage. In this way, they were able to reduce the flooding, which had previously lasted for 20-25 days each year, to 3 days. Their work and solution

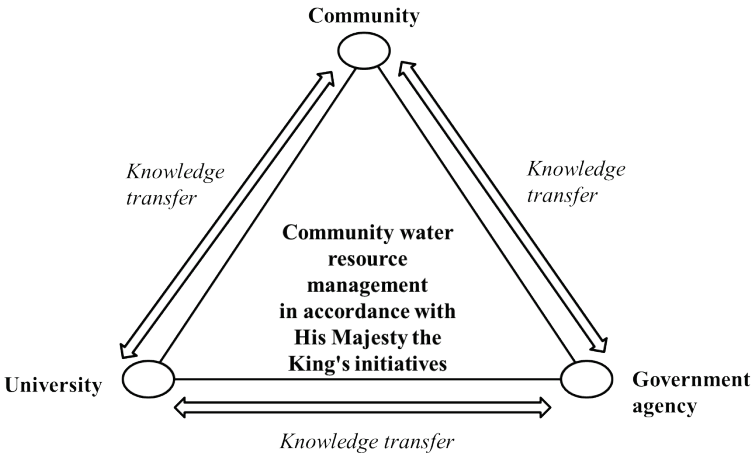
meant that the government no longer had to spend money to address problems following the flood as in previous years. In a further collaboration between the government agencies in the area and the community, Ban Kuan Community has also developed a clean water-producing project to solve the problem of soil water. To do so, they set up a clean water committee, comprising volunteers from the community, who collected fees from the people and fixed any problems that arose. As a result, people have a better quality of life and can reduce the expense of buying clean water. By applying the new agriculture theory in the area, the community has reduced the expense of farm owners, increasing their income by as much as a factor of three. Ban Kuan has also become a model for other communities nearby, and the project is being transformed under the name 'One Tambol (sub-district), One New Agriculture Farm'.

Along with the work mentioned above, the new agricultural theory has also led to innovation. In the past, the crops in this area had to be grown in the soil surface, and they would all be damaged during periods of flooding. It was therefore proposed to grow crops in cement pipes, allowing planting all year round, regardless of environmental conditions and enabling control of the level of water required by each type of plant, making them fruitful even when not in season (e.g. lemons).

### 4.2 Pattern of Knowledge Transfer in Managing Community Water Management

Our study of patterns of knowledge transfer for local community water resource management in accordance with royal initiatives found that practical implementation requires the collaboration and knowledge of government agencies, educational institutes, and local people. This must begin by building up people's knowledge of water management under royal initiatives. Then, by employing technology for exploring water sources and drawing water maps, everyone can gain insight into water in the area. That knowledge is then implemented to develop water according to local conditions, with management based on people's capability in both normal and crisis situations. This leads on to accessing water; a water management committee must be established for effective work and knowledge exchange between people, government agencies, and educational institutes. More specifically, knowledge exchange is critical for people's understanding of the area's geography, weather, society, culture, beliefs, and local knowledge to increase agricultural production and incomes. The problems of flooding and drought can also be eliminated. The final stage of the project is to expand its success to other communities and to plan in collaboration with other sectors, leading to stable water management. The research results show a triangular pattern of knowledge transfer in these water management projects, involving local people, government agencies, and universities (Figure 4).

Figure 4. Knowledge Triangle in community water resource management.



The knowledge triangle found in Pa Phayom Community was found to be slightly different, as it is considered to be in the start-up phase while Ban Kuan Community is in the scale-up phase. In the start-up phase, the knowledge triangle pattern involves local people considered as owners of the water sources and water problems in the area. They transfer this information to the government agency and university, who acknowledge this information and at the same time transfer knowledge for water management in accordance with the royal initiatives and new agriculture theory to the people, along with technology to solve the problem as appropriate. The government agency and university

understand all the area's water problems and requirements and transfer suggestions, knowledge, and consultancy to the people, such as planning, solutions, and follow-up.

In the scale-up process, the knowledge triangle pattern involves community transfer of knowledge to nearby communities. Government agency also provides suggestions concerning water management and seeks support and facilitation from other relevant sectors to support works in progress. The university provides knowledge about business administration, such as basic marketing skills, how to launch products, and how to access groups of customers. This knowledge of marketing and finance improves understanding of the principles of income increase and expense reduction over the long term. The university also provides knowledge about network building for managing water and exchanging knowledge.

## 5. CONCLUSIONS AND RECOMMENDATIONS

Water management at local community level is considered essential for sustainability. This study of patterns of water management knowledge transfer among community, government agencies, and universities in accordance with royal initiatives in the southern part of Thailand found that collaboration among local people is central to the process, making them self-reliant in the long term. Three main concepts were identified as critical for successful water management; understanding water, accessing water, and developing water. The pattern of knowledge transfer found here was a knowledge triangle that includes local people, government agencies, and universities. The findings indicate that in order to gain from the proactive involvement of government agencies and universities, local people must be the project's main driving force; the other two actors will support and facilitate the project by providing knowledge, technology, and consultancy. In addition, it was found that knowledge and information to be transferred across sectors must reflect the current situation in the area (e.g. start-up or scale-up phase). This triangular pattern of knowledge transfer enables collaboration in water management in accordance with royal initiative projects as appropriate to each phase of project development.

## REFERENCE LIST

1. Argote, L. & Ingram, P. (2000). Knowledge Transfer: A Basis for Competitive Advantage in Firms. *Organization Behavior and Human Decision Processes*, 82(1), 150–169.
2. Bunclark, L., Carter, R., Casey, V., Day, S. J. & Guthrie, D. (2011). *Managing Water Locally: An essential dimension of community water development*. Institution of Civil Engineers, Oxfam GB and WaterAid.
3. Distanont, D. (2012). Knowledge transfer in requirements engineering in collaborative product development. Dissertation, University of Oulu, Finland.
4. Distanont, A., Haapasalo, H. & Vaananen, M. (2014). Organising knowledge transfer in requirements engineering over organisational interfaces. *International Journal of Innovation and Learning*, 15(1), 42–64.
5. Hydro and Agro Informatics Institute. (2015). Community Water Resource management (applied from His Majesty the King's initiatives) [online]. Retrieved from <http://www.haii.or.th/haiiweb/index.php>.
6. Maiklud, P. (2007) *Management of Integrated Sustainable Resources*. Bangkok: Kasetsart University.
7. Nonaka, I. & Takeuchi, H. (1995). *The Knowledge-Creating Company: How Japanese Companies Create Dynamics of Innovation*. New York: Oxford University Press.
8. Sultana, F. (2009) Community and participation in water resources management: gendering and naturing development debates from Bangladesh. *Transactions of the Institute of British Geographers*, 34(3), 346–363.
9. Thai Meteorological Department. (2015). Fact sheet [online]. Retrieved from <http://www.tmd.go.th>