



## A Study on Integrated Water Resources Management and King Bhumibol's New Theory on Land and Water Management in Wattananakorn area, Sa Kaeo Province, Thailand

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### ABSTRACT

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**Objective** – Recently, Thailand has experienced drought and flood frequently. Both drought and flood events have caused loss and damage to agriculture, industry and community areas. Current water management practices may not be sufficient to cope with the risk of drought and flood. The effective water management is needed in Thailand. The Integrated Water Resource Management, IWRM, has been recommended by many related organizations. However, water management in Thailand has not yet been successful due to many reasons from many stakeholders. In 1992, His Majesty the King introduced the concept of the King Bhumibol's New Theory on Land and Water Management which emphasizes a proper land and water management for the optimum benefits.

**Methodology/Technique** – The study reviews the previous literatures in related areas.

**Findings** – There are some parts of IWRM and New Theory which are similar to each other. The principle of "Water as a finite and vulnerable resource" of IWRM can be overlapped with the stages of "Guidelines" and "Enough to live on and enough to eat" of New Theory.

**Novelty** – If the water management is still the top-down idea from the government, the situation will be critical soon. Local governments also agree and going to implement the participation approach. The strong participation of local communities in water management is the most important and will increase self-consciousness and self-sustainability communities.

**Type of Paper:** Review

**Keywords:** Integrated Water Resources Management, King Bhumibol's New Theory on Land and Water Management, Local communities, Sustainability

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### 1. Introduction

Thailand is an agricultural based country located in Southeast Asia. Recently, Thailand has experienced problems about water; include flood, drought, and water quality, frequently. The extreme flood and drought in the rainy and dry seasons, respectively, are two major problems of Thailand's water crisis. Both drought and

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flood events have caused loss and damage to agriculture, industry and community areas. The example of the worst damage from flood in Thailand is the worst flood in half century, 2011 Thailand flood. The flood crisis impacted a total of 4,039,459 households and 13,425,869 people; 2,329 houses were completely destroyed, while 96,833 houses were partially damaged; death toll reached to 657 people and 3 were reported missing. As of December 2011, World Bank estimated damages to have reached THB 1,430 billion (USD 46.5 billion). The damages to physical assets amount to THB 630.3 billion (USD 20 billion), where associated losses in economic activities sum up to about THB 799 billion (USD 26.5 billion). It should be noted that these estimates assume losses will occur over the three years period of 2011-2013 (Hydro and Agro Informatics Institute, 2012; The ministry of finance, royal Thai government and the world bank, 2012). The example of drought in Thailand is in the present year. It is reported as the worst drought in two decades, with 14 out of 76 provinces hit. The drought is expected to last until June, when the rainy season usually begins, costing the country's damage about THB 119 billion (USD 3.37 billion) but the damage could reach THB 154 billion if it continues until October (Thai rice mills association, 2016).

The effective water management is needed because the current water management practices are not sufficient to cope with the risk of drought and flood. The water resources management is assigned to be taken care by four main ministries; Interior, Industry, Agriculture and Cooperatives, and Natural Resource and Environment. In order to consider on different parts of water management, different departments may make different provision for specific circumstances, for example, the Royal Irrigation Department (RID) of the Ministry of Agriculture and Cooperatives is responsible for the provision of irrigated water for agriculture, the Department of Water Resources (DWR) of the Ministry of Natural Resource and Environment is the core agency in the formulation of policy and integrated water resources management plan in the river basin system including an early-warning system (Global Water Partnership, 2013).

The Integrated Water Resource Management, IWRM, has been recommended by many related organizations. It is defined by the Global Water Partnership (GWP) as a process which promotes the coordinated development and management of water, land and other related resources. Due to rapid economic development in the past decade, water demand continues to grow in the demand for water-related services for hydropower or electricity, irrigation, domestic and industrial usage. The agricultural sector remains the main user of available water and accounts for 71 percent of total water demand; the industrial sector accounts for two percent, the domestic sector for five percent and the remaining 22 percent are for ecological balance. The trend, however, is for a reduction in the share of agriculture with a corresponding increase in both industrial and domestic water usage (Sethaputra et al., 2001). Water management in Thailand can be classified into 3 periods of time (TDRI, 1990), as follows:

- 1283 to 1857 - Managing people to suit water conditions: Water management was accomplished by moving people closer to or away from water sources as necessary.
- 1857 to 2001 - Supply-side management: The country was relatively free from war and the stable production of rice for consumption and export was feasible.
- 2001 to 2025 - Demand-side management: Thailand is entering a period, in which population and economic development pressures will dictate the water management.

As of now, some particular areas experience both flooding and drought conditions in a single year. Both flood and drought situations in Thailand, not only highlights the climate change which is occurred everywhere in the world but also many important water management issues and problems. The water management issues include, but not limited to, the lack of political will, political intervention in other agencies' efforts, short-term government, poor mechanisms and management capacity, and other fragmented management systems. There are also many independent water and water-related agencies that have their own agendas which are not integrated together (Chintraruck, 2013). Wattanakorn area, Sa Kaeo Province, is one of the area that is faced with both flood and drought. It is located in the east of Thailand. The average yearly rainfall were 1,450.8

1,268.3 1,181.7 1,428.1 1,399.7 and 2,015.3 mm in 2008 to 2013, respectively. Even the average yearly rainfall is similar to the average yearly rainfall in Thailand, there is still the problem of drought because there is no effective reservoir that can store water for the dry season. Also, this area is located outside the irrigation zone, therefore, the water used in this area is only from the water supply and rainfall.

In 1978 and 1997 His Majesty initiated two reservoirs in this area, Upper and Lower Chong Klam Reservoirs, respectively, to solve the problem of flood and drought. The reservoirs can help holding water temporarily in flood and can store water to use in the drought. His Majesty also includes the royal projects and royal initiative projects on agricultural, educational, and water resources development in this area. In 1992, His Majesty the King introduced the concept of the King Bhumibol's New Theory on Land and Water Management which emphasizes a proper land and water management for the optimum benefits. This philosophy encourages farmers to conduct their lives in moderation and enables them to become self-reliant. In the other hand, the water management is needed to be the bottom-up strategy includes the strong participation of local communities in water management. It is the most important and will increase self-consciousness and self-sustainability communities.

In order to propose the bottom-up strategy for the self-consciousness and self-sustainability communities, there should be the suggestion which is specific for each area. The suggestion based on Integrated Water Resources Management is effective in many areas. However, there is some specific problem that needs specific solution. Also, the King Bhumibol's New Theory on Land and Water Management becomes well-known, recently, in Thailand as it proposes guidelines for the proper management of land and water. Therefore, the overall objectives of the present study are to compare the Integrated Water Resources Management with the King Bhumibol's New Theory on Land and Water Management and to promote the suggestion at local level, in Wattanakorn area, by strengthening and encouraging community initiatives.

## 2. Methodology

### 2.1 Integrated Water Resource Management, IWRM

The Integrated Water Resource Management, IWRM, was first mentioned in the international conferences on water and environmental issues in Dublin and Rio de Janeiro held during 1992. At that time, it was just the concept of IWRM. The concept of IWRM was released because the problems about water risk are increasing rapidly. The growth in population needs the increase of water requirement. The growth of economic needs water to fulfill the activities. The growth of human activities, include domestic, agricultural and industrial, can cause the water pollution. The water pollution can cause the water scarcity which need more clean water. The water scarcity, finally, causes water stress. Thus, the overall problems are caused by inefficient management and increased competition for the finite water resource.

It is, at that time, too challenging to solve the water problem, then, IWRM has neither been unambiguously defined nor has the question of how it is to be implemented been fully addressed. The challenging of water resource management was mentioned by the Global Water Partnership, GWP, (Global Water Partnership Technical Advisory Committee, 2000) that "To strike a balance between the use of the resources as a basis for the livelihood of the world's increasing population and the protection and conservation of the resource to sustain its functions and characteristics". It means the basis of IWRM based on many different uses of finite water resources and they are interdependent. It is already mentioned in part 1 that IWRM has been defined by GWP (Global Water Partnership Technical Advisory Committee, 2000) as "a process which promotes the coordinated development and management of water, land and related resources, in order to maximize the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems". The four main principles of IWRM can be shown in Figure 1. The information is provided by GWP (Global Water Partnership Technical Advisory Committee, 2000) and can be sketched as the shown diagram. These principles are not static; hence, they need to be updated and implemented to be the specific

solution for each area. Not only these four principles are required, two types of integrations should be developed with them, the natural system and the human system integrations.

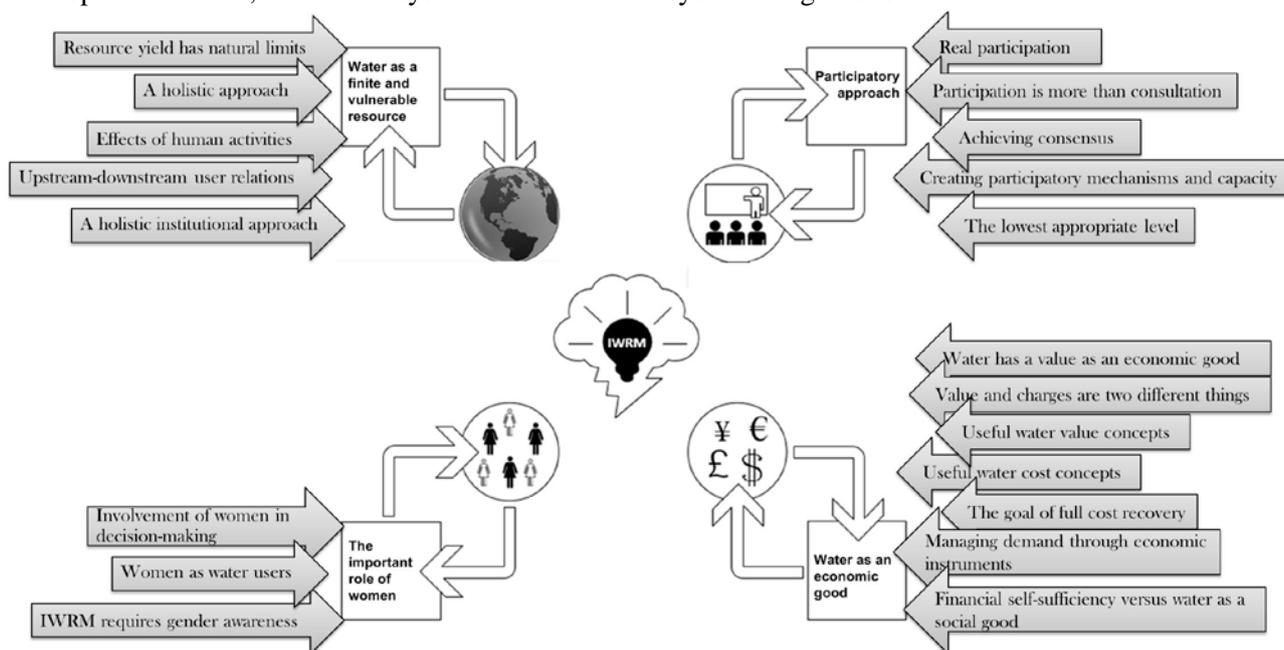


Figure 1. Main principles of IWRM

## 2.2 King Bhumibol's New Theory on Land and Water Management

Under his accession to the throne of Thailand, His Majesty King Bhumibol Adulyadej declared that he would rule with righteousness *"for the benefit of the Thai people"*. There are many Royal projects, under the Royal Patronage of His Majesty the King, for the betterment of the people. From the past to present, Thai farmers experience the problems of scarcity of land and water, include excess water. Natural water which is only rainwater is the main water resource. H.M. King Bhumibol Adulyadej, did aware of this problem, and then, conducted practical research on the area near Mongkol Chaipattana Temple in 1989. After that, His Majesty also had the other Royal projects for management and development under the supervision of the Chaipattana Foundation as a model to demonstrate agricultural development. In these Royal projects, there is the coordination among local community and local government to promote farming and ethical conduct among the people in the rural area. This concept became known as the "King Bhumibol's New Theory on Land and Water Management" (Yenjabok et al., 2005; National news bureau of Thailand, 2016). The concepts on the New Theory were incorporated by the government as national policy under the Eighth National Economic and Social Development Plan (1997-2001), which emphasized greater effort in promoting the development of sustainable agriculture (Pookpakdi, 1992).

The royal concept of the New Theory is *"a methodology or principle in managing resources infields or simply water and land for agriculture in small land plots to generate the greatest amount of benefit"* (National news bureau of Thailand, 2016). It is called as a "New Theory" because of three main reasons. The first one is it is the first time there is the concept to divide land into four portions and each portion has been recommended to do specific activity. The second reason the volume of water needed in the area is calculated from the academic knowledge and experience and this amount of water will be enough for planting and raising of marine life and water plants. The third reason is there is the completeness of stage to implement the New Theory (The Chaipattana Foundation, 2016). As mentioned, His Majesty also proposed three stages to implement the New Theory as shown in Figure 2. The first stage can be called as the guidelines that farmers can improve themselves. The second stage is the stage of enough to live on and enough to eat that farmers can develop their

community's potential. The third stage is the wealthier and farmers can get into the groups, have a better living, and stand to benefit.

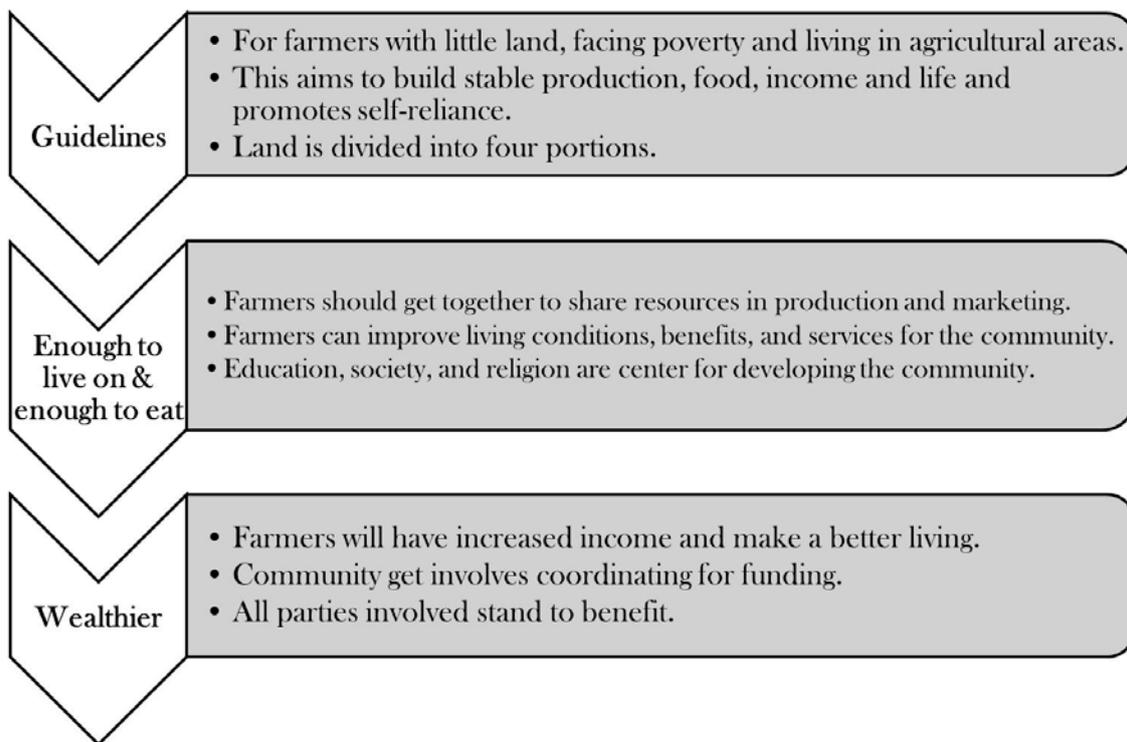
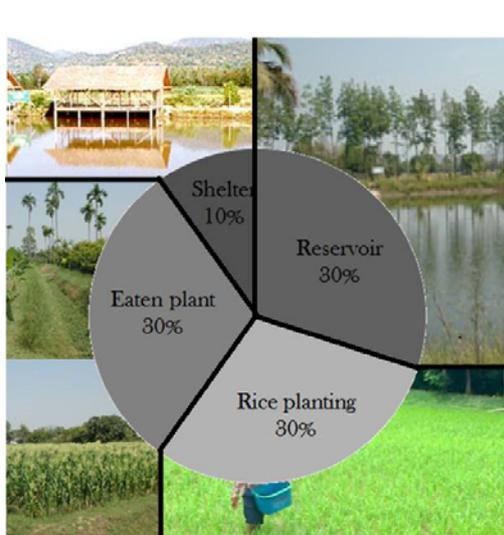


Figure 2. Three stages to implement the New Theory (After National news bureau of Thailand, 2016)

As the first stage is to start doing the guidelines and improve lives, there is the most important concept for this stage. The farmers should divide their land into four parts. Each part must have the specific activity as shown in Figure 3. The recommended ratio for the land dividing is 30:30:30:10 (The Chaipattana Foundation, 2016). However, this ratio can be adjusted according to the suitability of the area conditions. The demonstration model for this theory is settling up at Wat Mongkol Chaipattana called "Wat Mongkol Chaipattana Royal-initiated Area Development Project" and the ratio is adjusted to be the new portions which are 16:35.5:24.5:24 (Pamomsod, 2006).



- The first 30% should be the area for rainwater collecting in rainy season. The collected water in the reservoir should be enough to irrigate the crops and for other fish and aquatic plants throughout the year before the next rainy season.
- The second 30% is for rice planting. The farmers should prepare rice, which is the main food for family's meal, for household needs.
- The third 30% is for planting of other plants those can be eaten as family's meal, for example, fruits, vegetables, crops, etc., depending on the local conditions, household needs, and the market demand.
- The last 10% is a land for building a house, paths, ditches and other structures. It can be used for growing more household vegetables and raising livestock.

Figure 3. Land portions for New Theory stage 1 (After The Chaipattana Foundation, 2016)

### 3. Results and Discussion

#### 3.1 Comparison of IWRM and King Bhumibol's New Theory

From four principles of IWRM and three stages of New Theory, it can be concluded that there are some parts of IWRM and New Theory which are overlapped to each other. In order to explain the similar area of these two theories, Figure 4 can be better used.

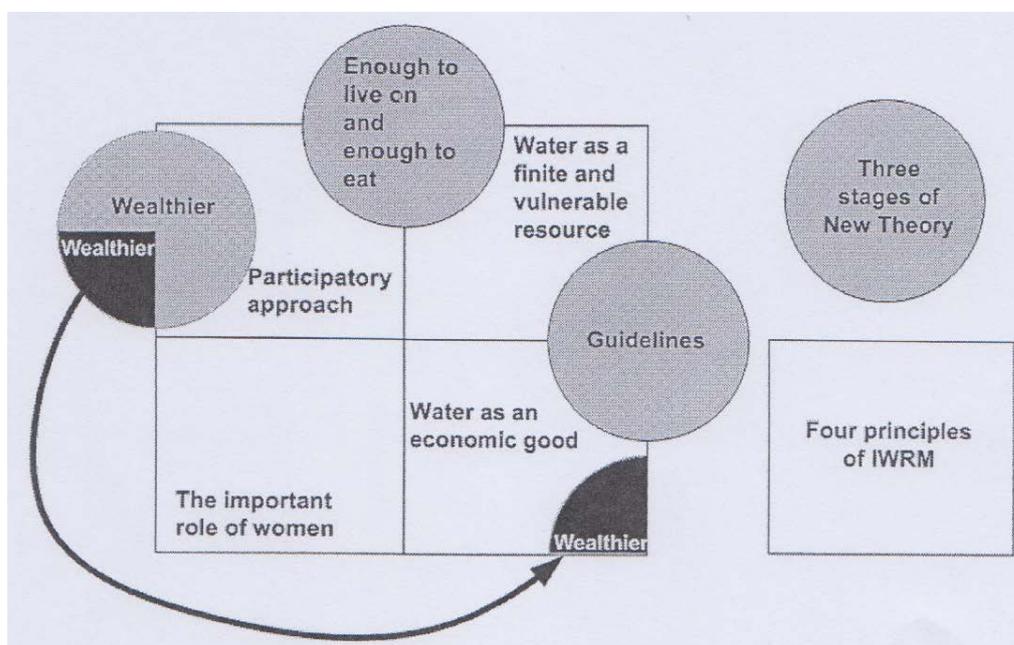


Figure 4. Comparison of IWRM and King Bhumibol's New Theory

The principle of "Water as a finite and vulnerable resource" of IWRM can be overlapped with the stage of "Guidelines" of New Theory in the part that water is limited and can be collected only if in the rainy season,

if there is no reservoir it means there will not be water throughout the year. The "Guidelines" recommend farmers to collect water in at least 30% of land area. Also, the principle of "Water as a finite and vulnerable resource" of IWRM can be overlapped with the stage of "Enough to live on and enough to eat" of New Theory in the part that farmers should have and share the resources, especially water, with their community to improve the living conditions.

The principle of "Participatory approach" of IWRM can be overlapped with the stage of "Enough to live on and enough to eat" of New Theory in the part that the community sharing is the main target of this stage. If the farmers have enough to live on and enough to eat, they can share and raise up the participant groups or cooperation to help developing the community. Also, the principle of "Participatory approach" of IWRM can be overlapped with the stage of "Wealthier" of New Theory in the part that if the community is strengthen and become self-reliant, it will increase the right of negotiation with other parties, self-consciousness and self-sustainability community.

The principle of "Water as an economic good" of IWRM can be overlapped with the stage of "Guidelines" of New Theory in the part that the full economic cost consists of: the full supply cost due to resource management, operating and maintenance expenditures and capital charges, the opportunity costs from alternative water uses, and the economic externalities arising from changes in economic activities of indirectly affected sectors. Therefore, to collect water in the area means that farmers reduce economic costs they have to pay for water. Also, the principle of "Water as an economic good" of IWRM can be overlapped with the stage of "Wealthier" of New Theory in the part that if the community is strengthen and become self-reliant, it will increase the right of negotiation with other parties.

### 3.2 Recommendations on water management in Wattanakorn area, Sa Kaeo Province

Wattanakorn area is the district located in Sa Kaeo Province as shown in Figure 5. There are 11 sub-districts include 115 villages. The research was done with only 2 sub-district to set up the small local communities. It is found that there are lots of problems about water, especially, drought, water conflict and water quality. Then, the idea for water management is the integration between IWRM and New Theory. The good example of strength community is one of the villages in this area. The residents set up the cooperative for water management and there is no problem of drought. However, the rest area still experiences drought and lack of water supply. It can be confirmed that the community participation helps to solve this problem. The other villages are now trying to set up their own cooperatives. The idea of wetland and retention pond is also implementing.

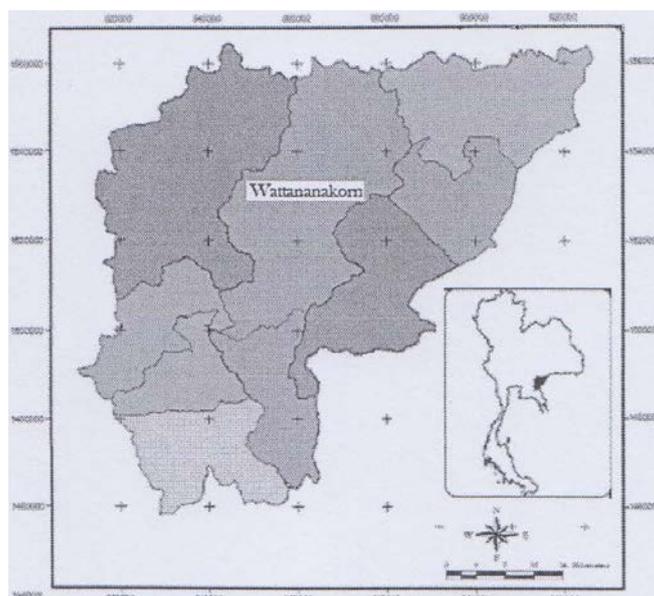


Figure 5. Wattanakorn area, Sa Kaeo Province

There has been the conflict between the upstream and downstream water users. Then, the solution, decided by the communities, is the construction of check-dams. Using the idea of land portions from New Theory, the area for collecting water can also be provided in the public area. The local government also mentioned the bottom-up strategies. The requirements from communities are needed to be applied for local water management. In order to fulfill the New Theory, there is also the study of suitable plants. It is found that most of the soil is not suitable for rice planting. It would be better to plant cassava, sugar cane, and maize.

It was found from the present study that the present water management is still the top-down strategy. Communities never had chance to make any decision. However, after the public hearing in 2 sub-districts, it can be seen that people in all communities would like and are ready to participate. They realize that if the water management is still the top-down idea from the government, it will be in the critical stage soon. Local governments also agreed with this idea and will implement the participation approach. It is believed that the strong participation of local communities in water management is the most important and will increase self-consciousness and self-sustainability communities.

#### **4. Conclusions**

There are some parts of IWRM and New Theory which are similar to each other. The principle of "Water as a finite and vulnerable resource" of IWRM can be overlapped with the stages of "Guidelines" and "Enough to live on and enough to eat" of New Theory. The principle of "Participatory approach" of IWRM can be overlapped with the stages of "Enough to live on and enough to eat" and "Wealthier" of New Theory. The principle of "Water as an economic good" of IWRM can be overlapped with the stages of "Guidelines" and "Wealthier" of New Theory. The main points of these two theory can be summarized as the value of water and the community participation. The local water management in Wattanakorn area is still the top-down strategy. After the public hearing in 2 sub-districts, it can be seen that people in all communities would like and are ready to participate. They realize that if the water management is still the top-down idea from the government, the situation will be critical soon. Local governments also agree and going to implement the participation approach. The strong participation of local communities in water management is the most important and will increase self-consciousness and self-sustainability communities.

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