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2. Development of Effective Water Management Institutions in Thailand

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Introduction

The “Regional Study on Development of Effective Water Management Institutions” project originally included the five countries of China, Indonesia, Nepal, Philippines, and Sri Lanka. The overall project was funded by the Asian Development Bank, while funding for Thai research activities was funded by the Thai Research Fund. In 2001 during a regional workshop held in Indonesia, Thailand expressed interest in participating in the project. With the help of IWMI, a work plan was prepared for Thailand and research was initiated on the Bang Pakong and Mae Klong River Basins in Thailand. A goal of the project was to develop methods to link assessments of physical characteristics, water accounting, irrigation performance assessment, and socio-economic analysis in a manner that will improve the management of water resources within two river basins. The overall purpose was to develop a framework for water management that is comprehensive and integrated, participatory and responsive, and dynamic and strategic. Within this framework, policies and institutions can be improved and strengthened that will in turn improve the management of water resources. The project was a collaborative effort between Kasetsart University, Faculty of Engineering, the Office of National Water Resources Committee, and the International Water Management Institute. Kasetsart University played a lead role in coordinating research activities in Thailand.

General description of the river basins

The Mae Klong River Basin is one of 25 major river basins and is located in the western part of the country. The total drainage area is approximately 30,800 square kilometer. Among the twenty five main river basins in Thailand, the Mae Klong River Basin has some of the most abundant water resources. The river consists of two main tributaries: the Khwae Yai and the Khwae Noi and two large reservoirs: the Srinagarin and Vajiralongkorn which were constructed on these tributaries, respectively. A large amount of water originates in the upstream drainage basin to feed the 3 million *rai* of the Greater Mae Klong Irrigation Project (GMKIP). Yet, inadequate water supply for downstream irrigated paddy cultivation and domestic uses persists. Current plans call for water from the Mae Klong River to be diverted for the domestic water supply of the Bangkok area by the Bangkok Water Authority.

The Bang Pakong River Basin is located in the east of Thailand. The basin has a drainage area of 18,500 km² and a reservoir storage capacity of 131 mcm. The total irrigated area is reported to be 2.1 million *rai* (3,328 km²) (Department of Irrigation Engineering, 2002). The mean annual runoff is estimated to be 3,712 mcm. The major infrastructural characteristic of the basin is the Bang Pakong Diversion Dam. The dam is designed to regulate the flow of water to reduce salinity intrusion during the dry season. Irrigation systems in the basin tend to be small in size relative to the GMKIP.

Analytical Framework

The study utilizes three distinct elements: water accounting, socio-economic analysis and irrigation performance assessment, and institutional analysis. Water accounting is used to determine how and how much water is being used, consumed, and is available. The purpose of the socio-economic research component is to establish the tradeoffs between policy objectives and stakeholder interests (Samad and Bandaragoda 1999). This implicitly addresses an examination of possible winners and losers from a change in policy, particularly in consideration of poverty alleviation. An evaluation of irrigation performance is conducted to assess how well irrigation systems are being operated in terms

of efficiency and financially. The institutional analysis is conducted to assess and evaluate the current institutional setting for water resources management.

The three components are linked so as to maximize the contribution to the development of effective water management institutions in Thailand. The three-pronged analytical approach is depicted in Figure 1. For example, starting with the socio-economic profile, it involves analyses of stakeholders and their links to institutions and water use. An important goal of the socio-economic analysis is to determine how the individual stakeholder fits into the overall hierarchical power/influence structure and what opportunities and constraints this poses to the development of effective water management institutions (institutional analysis). A corresponding goal is to determine how the individual stakeholder influences water use and availability within the basin water accounting.

The analysis will examine the crucial link between managers and users of water. This aspect includes methods for exchange of information, requests for water delivery, resolution of conflicts, and other aspects necessary to formulate an effective and responsive water management process. The institutional research aims to concretely assess the relationships between the individual stakeholders (particularly the poor) and the institutions that guide the management of water. Official and unofficial institutional agencies and organizations will affect the management and utilization of water within the basin. These organizations can include national or local government agencies, local water user groups, and unofficial social arrangements among others.

The analysis will also determine which groups have effective power/influence regarding the management of water resources. It is important to determine what factors give certain groups influence and which factor undermine the influence of others. This effectively assesses matters of inclusion or exclusion in the management process.

Data and analysis

During the planning of the Water Accounting component it was decided to take advantage of existing hydrologic gauging stations. Each river basin was sub-divided into several sub-basins according to the location of the existing gauging stations. This greatly facilitated the collection of data for water accounting. In order to maximize the ability to do cross-component comparisons and analysis, it was also decided to use the same sub-divisions for the socio-economic component. District and sub-district socio-economic data was collected for the years 1994, 1996, 1999 for the both basins and agricultural data was collected for the years 1996-2000 for the Mae Klong River Basin and for the years 1995, 1996, 1999 for the Bang Pakong River Basin and then aggregated to the sub-basin level. Hydrologic data was collected by the Royal Irrigation Department and field surveys.

Results and Discussion

Water accounting

Water accounting is a framework for describing the use and productivity of water within a given area. The methodology for water accounting is based on the use of water balances. It considers the inflows and outflows for different water use boundaries such as basins, sub-basins, and smaller divisions. Based on the Water Accounting, the Mae Klong River Basin can be sub-divided into three distinct sections. The upstream sections can be described as open (an open basin is one where there are remaining uncommitted, utilizable outflows). A closed basin is one where all available water is depleted. The emphasis of future management activities should be natural resources conservation. This area is primarily mountainous and covered by forest. There are many benefits from preserving this area including water storage, flood protection, and environmental protection. The second division includes the mid-stream areas where the water accounting results showed that these areas are closing and currently experience a relatively high degree of water use. Future management direction should focus on the further development of water resources in this area. The final division is the Greater Mae Klong Irrigation Project, which can be described as closed. Future management efforts in this area should be focused on improving the management of the water within the existing context.

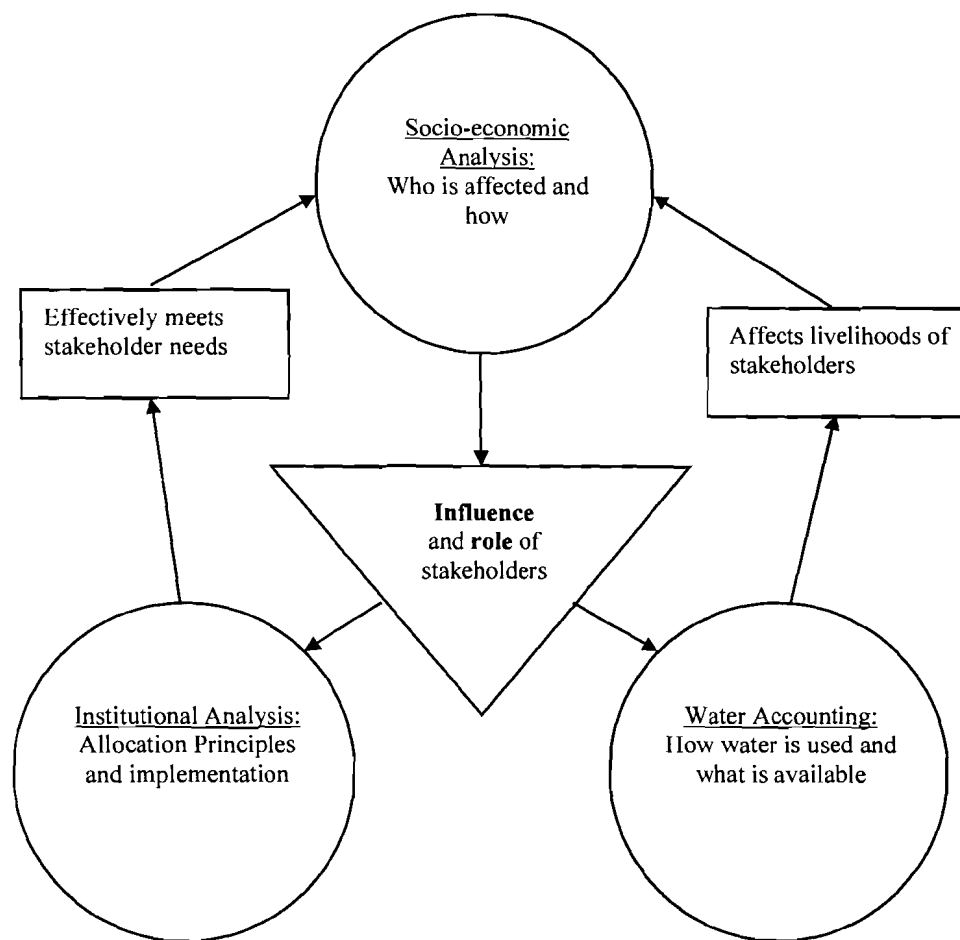


Figure 1. Linkages between Socio-Economic Analysis, Institutional Analysis, and Water Accounting Research Components

For this study, the Bang Pakong River Basin was divided into seven different sections. These sections were based on the existence and location of gauging equipment that would facilitate the study, as data was readily available. The seven sections were also used for the Socio-Economic Analysis to facilitate comparisons and identification of linkages between the different research components. Water accounting calculations were undertaken for each section on a seasonal and annual basis. The importance of storage and inter-basin transfers of water into the basin are shown by the high depleted fraction during the dry season. This high fraction of depleted water use is evident on an annual basis as well.

Socio-Economic analysis

Socio-Economic Analysis was conducted with special attention paid to the poverty situation in the basin and the impacts that this can have on effective management of river basins. Analysis showed that the further upstream one moves the higher the incidence of rural poverty. This also corresponds to drastic reductions in the percentage of irrigated farms (one exception is the middle Khwae Noi area where it was felt that the actual amount of irrigated farms are not accurately accounted for because of unofficial pumping operations). The rural poverty rate ranges from 0% in the Greater Mae Klong Irrigation Project up to 79% in Lam Taphoen and Khwae Yai Upper Sub-Basins (using the official Thai Poverty Line). The gender structure of rural poverty remains roughly constant averaging about 49% when considering all but the Greater Mae Klong Irrigation Project Area (where official poverty does not exist). The analysis demonstrated a positive correlation of poverty with the percentage of

farms irrigated. Other factors that need to be considered in relation to poverty within agriculture include distance to market, development level of local markets, and suitability of land for farming.

Influence in the policy making process among all water users is shown to be lowest for farmers and even lower for poorer, non-irrigating farmers. However, farmers are still the largest bulk user of water. It will be necessary to address this traditional imbalance between influence on policymaking and irrigation water use. As water scarcities increase, the potential exists that the more influential users (e.g. metropolitan areas and hydropower) will gain a larger share of the water at the less influential users' (e.g. farmers) expense. This could exacerbate the poverty problem within the basin.

A trend was noted within the agricultural sector of declining prices in paddy. There is also an apparent decline in the yield levels of paddy in the upstream (and poorer) sections of the basin. The upstream sections tend to concentrate production on maize and cassava rather than paddy due to the lack of irrigation. One cropping/irrigation trend that could have significant impacts on the future water use within the basin is that of sugarcane, which comprises 34% of the current cropped land area in the basin. Sugarcane is currently grown largely as an under-irrigated crop. If farmers in the basin decided to start irrigating sugarcane fully, then there could be large impacts over the current level of water used by irrigators.

From the Socio-Economic Analysis, a number of conflicts were identified that currently exist between various water users within the basin. The dominant characteristic of the conflicts is that they primarily involve agricultural water users versus another group or conflicts among different groups of agricultural water users. Since agricultural water users were shown to be the least influential in the decision-making process, they are likely to be the loser in any conflicts especially since effective conflict resolution mechanisms remain weak or undeveloped. Within agricultural water user groups, a poorer irrigator is likely to suffer a similar outcome.

Finally, an analysis of irrigation performance was conducted for the irrigation systems in the Mae Klong River Basin. The most striking feature of this analysis is the zero ranking for the financial self-sufficiency criteria. This is a direct result of irrigation being provided as a free public good. This creates a situation where the management of the irrigation system is fully dependent on funding from the government in order to operate. By not being financially independent, an irrigation system remains dependent on the government and more susceptible water management decisions that are not in the system's best interests. Finally, the relative irrigation supply and relative water supply indicators show there is adequate water for current irrigation needs. This does not, however, illustrate seasonal scarcities that may exist.

The Socio-Economic Analysis for the Bang Pakong showed that rural poverty is most concentrated in the two areas of Khlong Phra Sathung and Khlong Phra Prong. However, there does not appear to be any clear relationship between the poverty rate and the percentage of farms irrigated. The rural poverty rate ranges from 48% in the Khlong Luang Area up to 85% in Mae Nam Hanuman (using the official Thai Poverty Line). The gender structure of rural poverty remains roughly constant averaging approximately 50%. Of particular interest is the relatively low number of poor working in agriculture, which averages 21.6%. This is drastically lower than the 63% recorded in the Mae Klong River Basin.

Income per *rai* for paddy crops appears stable across the basin, except in Khlong Luang where income for paddy is trending upward. This mirrors an increase in yields for paddy in the Khlong Luang Area. Yields seem lower in the upstream portions of the basin; however, a definite conclusion will require more data. The upstream sections tend to have more land area in production of maize and cassava but paddy remains the staple crop.

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Institutional analysis

The Institutional Analysis was conducted to identify the institutional structure of water resource management. The most obvious finding of the Institutional Analysis is the strong national focus of the analysis. There appears to be little actual development of local and basin level institutions for the management of water resources. This stems in part from the lack of a comprehensive water resources law at the national level. Many local level developments tend to be undermined by low capacity to carry out assigned responsibilities. There also are a large number of diverse government agencies that carry some responsibility for management of water resources. In October 2002, a major reorganization of the government took place. Of relevance here, is that the Department of Water Resources is established under the Ministry of Natural Resources and Environment and the Office of the National Water Resources Committee (ONWRC) is dissolved and placed in this Department. Some units of the Royal Irrigation Department (RID), MOAC and of the Office of the Accelerated Rural Development (ARD) under the Ministry of Interior are also placed in this Department.

While the general concepts of effective water management have been recognized (e.g. river basin management, farmer organizations) and initial steps have been taken to implement these concepts, the existing structure is still lacking in its ability to effectively realize these management concepts. The guiding principles followed by the government for managing river basins are given as efficiency in problem solving, equity in allocation, and participatory management processes.

Within the Mae Klong River Basin, the development of water management is spread amongst several authorities. Most significantly, the Electrical Generating Authority of Thailand (EGAT) is responsible for large reservoirs, the Royal Irrigation Department (RID) is responsible for medium and small reservoirs and irrigation projects, and the Provincial Water Authority is responsible for large domestic water supply projects. These are but a few of the management authorities, but it can be seen that there is large potential for conflict among these different agencies. Additionally, there is a problem of budget allocations, where annual allocations are determined for individual departments, but the budgetary allocations are not coordinated based on the effective needs of various agencies and their responsibilities for managing water. Finally, the great diversity of managing agencies also creates a wide dispersion of the information needed to effectively coordinate and management water resources.

In 2001 the Mae Klong and the Bang Pakong River Basin Committees were established by the ONWRC. The River Basin Committees will have responsibility for management coordination and water resource regulation for the two rivers. The Institutional Analysis report cites the difficulties facing the newly formed River Basin Committees in fulfilling their tasks.

While many of the needed developments and reforms are embodied in the National Water Vision, there remains a large gap in setting up in concrete terms the necessary framework. The Draft Water Law, for example, calls for the establishment of the river basin committees and provides for a process of dispute resolution. However, the draft law does not grant either the river basin committee or the dispute resolution agencies any real authority to rule on disputes. Furthermore, the membership of the Mae Klong River Basin Committee does not include members from either EGAT or from the Bangkok Metropolitan Water Authority. The exclusion of two influential users of the Mae Klong River water could seriously undermine the effectiveness of the River Basin Committee, especially when conflicts arise.

The Bang Pakong Diversion Dam is operated by the Royal Irrigation Department. There are several conflicts surrounding its operation. The two most serious conflicts include balancing the divergent needs of water users below the dam and water users above the dam. The second conflict is between the water storage needs of the diversion dam and the environment. Original plans called for the construction of 12 storage reservoirs upstream. Environmental concerns are currently preventing the construction of these dams. This hampers the full effectiveness of the diversion dam. The recently established river basin committee will face a big challenge in resolving this issue.

Existing laws related to the management of water resources are often old and based on conditions that no longer exist. For instance, Section 1304 of the Civil and Commercial Code states that water in water courses is freely available and that the government cannot prohibit anyone from withdrawing this water. The Code does place limits on withdrawals based on limits of reasonable need upon users. The Royal Irrigation Act of 1942 addresses canal irrigation. The Royal Irrigation Act sets a limit for irrigation fees at 5 Baht per *rai* per year. Besides being extremely low, this fee is currently not collected in the basin. This creates a problem where the irrigation management is entirely dependent on receiving subsidies from the government in order to stay financially viable.

While many reforms have been made regarding changes in the administrative structure, there remain deficiencies in the management capacity of newly formed organizations such as the River Basin Committees, Tambon Administrative Organizations, etc. These organizations will need to receive substantial capacity building efforts to build the experience and know-how required to effectively manage the water resources under their control.

Final discussion

The water accounting component indicated the current situation of the basin. Currently, water is still adequate on an annual basis, but this situation may change due to a number of scenarios that may come to fruition in the future. Among these scenarios is increased irrigation by sugarcane growers and increased diversions to Bangkok. Either of these scenarios could create a situation where water quantities are insufficient to meet demand.

The Socio-Economic Analysis and Irrigation Performance Analysis highlighted the important role that irrigators play in water management of the basin. In particular, agriculture plays a significant role in the basin, both in terms of livelihoods and as a factor in poverty alleviation. However, it is also the sector with a significant portion of poverty. Farmers in general are not very influential in policy and the decision making process. They are, however, among the most vulnerable. If, as the water accounting section seemed to indicate, the upstream portions become the targets of conservation programs, then careful planning to avoid environmental damage from an increasingly desperate population will be required. It is a common occurrence in the region that when yields decrease and poverty increases in upland regions, then environmental degradation is accelerated.

In addition, the Socio-Economic Analysis illustrated the declining paddy prices faced by farmers in the river basin. Of particular note are what appear to be declining paddy yields in the upstream sections of the basin. While cassava and maize are much more significant crops than paddy in these sections, any downward trend in yields raises concerns about the sustainability of farming practices. This could create a situation where poverty increases in the upstream and income inequality increases within the basin.

Another significant conflict in the Mae Klong is between hydropower production (EGAT) and irrigators. Daily release schedules are determined based on hydropower production needs, while weekly demand requests are made by the irrigators to EGAT. Since daily releases are made to suit hydropower production needs, water is not delivered in a manner that is optimal for farmers. An examination of this conflict should be conducted to determine a more optimal operating schedule.

Prawn farming is becoming an increasingly popular agricultural activity. The returns per *rai* are far higher than for any crops. However, prawn raising activities can have many serious negative impacts, such as reduced yields in surrounding fields, polluted water released downstream, higher quantities of water used, and illegal abstraction of water to fill the ponds. An effective method needs to be implemented to balance the needs of all the various stakeholders. These methods can involve stricter enforcement of policies, incentives to discourage creation of externalities by prawn farmers, and compensation for injured parties. Prawn farming does offer a higher income earning option, which creates a strong factor to prevent interference in attempts to more effectively regulate it.

In general, the position of farmers within the decision-making process needs to be strengthened. Farmers must have a stronger ability to influence policy. This can involve larger groups of farmers such as federations of water user groups. It can also involve high-level representation or membership in a high-level decision-making body. Additionally, since all water for the Greater Mae Klong Irrigation Project comes from the Mae Klong River, it may be appropriate to incorporate that part of the irrigation project that lies in the Tha Chin River Basin into the Mae Klong River Basin for purposes of managing water resources.

The Institutional Analysis section indicated that while many positive steps have been taken toward the more effective management of river basins. In particular, the recognition of the need for river basin organizations to manage water from the basin perspectives, the need to establish farmer organizations to represent farmers, and the need to better coordinate water resources management among the many diverse agencies. However, more progress needs to be made to realize the ultimate goals of these changes. Foremost is the need to enact an effective and comprehensive national water law. The law should clearly spell out not only the duties and responsibilities of the different agencies, but it should also clearly specify the authority each agency will have in enforcing its duties and regulations. A shortcoming observed during field visits was that different agencies were either unclear of who was responsible for enforcement of policies or they lacked the means to do so. Managing parties should have some representation at a high level in the government in order to hold legitimacy and power in having their needs met.

Recognition of the need for stronger local management has led to the formation of river basin committees. This is a good fundamental move for better coordination of different agencies and representation of stakeholders at a more decentralized level. The biggest challenges facing the effective management of water resources in the Bang Pakong and Mae Klong River Basins are:

- The improvement of interagency and stakeholder communication and cooperation;
- The effective enforcement of policies and regulations;
- The creation of effective institutions that are responsive to farmer needs and can influence the decision-making process;
- The creation of an incentive system to regulate/control/compensate for water use patterns;
- The recognition of and response to increasing water scarcity.

This report has summarized the three research components conducted for this study and offered brief reviews. Linkages between the three components were made and recommendations were made regarding policy developments to devise more effective water resource management institutions to manage the water in the Mae Klong and Bang Pakong River Basins.

Acknowledgments

The author acknowledges the contribution of the following colleagues and their institutions to this study: Virapol Taesombut (Kasetsart University); Kobkiat Pongput (Kasetsart University); Surapol Pattanee (Department of Water Resources); Sukontha Aekaraj (Department of Water Resources); and Sivapong Kaysavawong (Department of Water Resources); Bancha Kwanyuen, (Kasetsart University); Ekasit Kositsakulchai (Kasetsart University).

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