ทางเลือกในการแก้ไขความขัดแย้งของการใช้น้ำ: กรณีศึกษาชุมชนแพรกหนามแดง จังหวัดสมุทรสงคราม

FEASIBLE ALTERNATIVES FOR SOLVING THE CONFLICTING WATER USES: A CASE OF PHRAK NAM DAENG COMMUNITY, SAMUT SONGKHRAM PROVINCE, THAILAND

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บทคัดย่อ

งานวิจัยนี้มีวัตถุประสงค์เพื่อสร้างทางเลือกในการแก้ไขความขัดแย้งของการใช้น้ำในชุมชนแพรกหนามแดง จังหวัดสมุทรสงคราม โดยมีการระบุผู้มีส่วนเกี่ยวข้องหลักที่ควรมีบทบาทในการตัดสินใจ รวมทั้งระบุปัญหาที่เกิดขึ้นจริงในพื้นที่ วิธีการศึกษาประกอบด้วยการวิเคราะห์ผู้มีส่วนเกี่ยวข้องด้วยวิธีเมตริกซ์ระหว่างความสำคัญ-อิทธิพล การสนทนากลุ่ม แบบสอบถาม และการสัมภาษณ์เชิงลึก ซึ่งผลการศึกษา พบว่า ผู้มีส่วนเกี่ยวข้องหลัก ได้แก่ เกษตรกร เจ้าหน้าที่ส่วนท้องถิ่น และเจ้าหน้าที่จากกรมชลประทาน ปัญหาหลักที่ได้รับความสนใจ 3 อันดับแรก ได้แก่ ขยะและวัชพืชในคูคลอง การปนเปื้อนของสารพิษทางการเกษตร และการควบคุมประตูน้ำที่ไม่เหมาะสม ทางเลือกที่นำเสนอเกี่ยวข้องกับ 3 ประเด็นหลัก ได้แก่ ประตูน้ำและการควบคุมประตูน้ำ ของเสียและตะกอน และความร่วมมือระหว่างผู้เกี่ยวข้อง ทั้งนี้ผู้มีส่วนเกี่ยวข้องแต่ละกลุ่มมีความคิดเห็นที่แตกต่างกันเกี่ยวกับประตูน้ำ โดยกลุ่มชาวนาชาวสวน และฟาร์มกุ้งต้องการให้เปลี่ยนประตูน้ำเป็นรูปแบบที่ออกแบบโดยชาวบ้านทั้งหมด ในขณะที่กลุ่มผู้เลี้ยงปลาสลิด และเจ้าหน้าที่ของรัฐต้องการรักษาประตูน้ำในรูปแบบเดิมแต่ปรับปรุงรูปแบบการระบายน้ำ ผู้มีส่วนเกี่ยวข้องส่วนใหญ่เสนอให้มีการส่งเสริมการใช้สารสกัดจากธรรมชาติในการเกษตรเพื่อแก้ไขปัญหาการปนเปื้อนของสารพิษทางการเกษตร เข้มงวดในการบังคับใช้กฎหมายเกี่ยวกับการจัดการของเสียจากภาคอุตสาหกรรม กระตุ้นจิตสำนึกเกี่ยวกับการจัดการของเสียในชุมชน รวมทั้งให้มีการกำจัดตะกอนจากคูคลองอย่างสม่ำเสมอ นอกจากนี้

ควรส่งเสริมให้มีความร่วมมือระหว่างองค์กรที่เกี่ยวข้องและชุมชนเพื่อการจัดการน้ำอย่างยั่งยืนในพื้นที่ต่อไป

คำสำคัญ: ทางเลือก ความขัดแย้งในการใช้น้ำ การจัดการน้ำแบบบูรณาการ ชุมชนแพรกหนามแดง สมุทรสงคราม

Abstract

This research aimed to investigate feasible alternatives for solving the conflicts regarding the water uses in Phrak Nam Daeng Community, Samut Songkhram Province, Thailand. Key stakeholders who should be involved in decision making and the actual problems occurred were also identified. Stakeholder analysis by importance-influence matrix and means of focus group discussion, questionnaires and in-depth interviews were undertaken. Findings showed that key stakeholders included farmers, local administrations and the government officers from the irrigation section. Three most concerned problems were garbage and weed in the canals, toxic contamination from agriculture and the mis-control of the gates. Suggested alternatives involved three main issues i.e. the gates and control, waste and sediments, and collaboration among stakeholders. Different stakeholders preferred different gate options. Paddy field farmers, orchard and vegetable farmers and shrimp farmers highly preferred to change the design of the built gates to the locals' design while snakeskin gourami fish aquaculture farmers and government officers preferred to keep all built gates but required improvement of the gates operation. The majority of stakeholders suggested an encouragement to use more bio-chemicals in the agricultural activities to solve toxic contamination from agriculture while preferred to restrict law enforcement about waste disposal for toxic contamination from industries. Most of key stakeholders preferred to promote local awareness on waste disposal and suggested to undertake regularly operation on the sediments removal from the canals. More importantly, collaboration between responsible organizations and locals should be developed for the most sustainable way of water management in the area.

Keywords: Feasible Alternatives, Conflicting Water Uses, Integrated Water Management, Phrak Nam Daeng Community, Samut Songkhram

INTRODUCTION

Water has a basic function in maintaining the integrity of the natural environment while it also is a key driver of economic and social development. Decisions on water allocation are always difficult for decision makers. Nevertheless, water development and management should be based on a participatory approach involving users, planners and policy makers at all levels (UN-Water and Global Water Partnership, 2007; Hassing et al., 2009).

In the case study, Phrak Nam Daeng community, Amphawa District, Samut Songkhram province, Thailand faces long-term serious water problem. It covers about 36.23 Km^2 with a population of approximately 3,850 people (www.phragnamdang.go.th). It is located on an estuary to the gulf of Thailand (Figure. 1). It is also called 'Three Water Town' where there are fresh water, brackish water, and also salt water. There are different type of activities with different type and amount of water requirement. Paddy fields, fruit orchards, snakeskin gourami fish aquaculture, industries and public uses require fresh water while shrimp and natural aquaculture farms require brackish and salt water (Thailand Research Fund, 2003; Sitthisantikul, 2004; Chirawate, 2005).

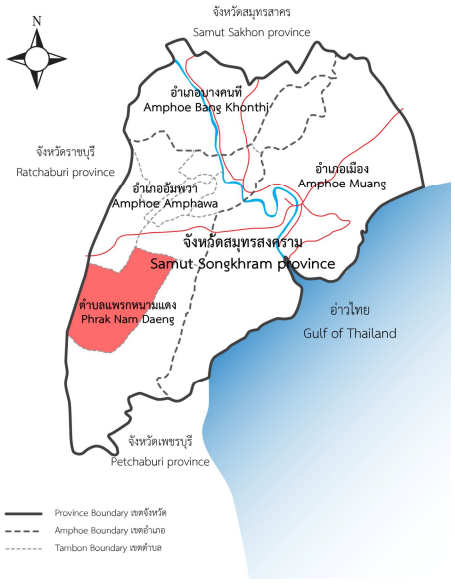

Figure 1 Map of the case study (modified from Thailand Research Fund, 2003).

As collective impacts from dam construction associated with Mae Klong watershed development plan since 1965, highway construction in 1973, and severe drought in 1979, Department of Irrigation established a number of water gates to prevent unexpected distribution of salt water from the sea around Samut Songkhram province. The design of the gate is a semi-permanent closed gate that can block the salt water to disperse into the canals when the sea level rises. Unfortunately, the gates became problems causing conflicts between different users over the use of water. This is because the gates obstruct the water flow causing sediments behind the gates. Some chemicals from agriculture and industries can also contaminate in the sediments. When open the gates (the whole gate is lifted), contaminated sediments go to shrimp farms and cause serious damages. The problems become more serious when drought or flood occurring as some villagers will open the gate without a permission to obtain or release water for their own sake and this leads to the severe conflicts over the water uses within the communities. This indicates an example of inappropriate management procedure from the top-down management approach (Thailand Research Fund, 2003; Sitthisantikul, 2004; Chirawate, 2005; Mongkol et al., 2012)

After a long term research by the local communities themselves, new design of the gates was developed. The gate consists of two semi-separated parts; upper and lower parts. The upper part is controlled by tide; for high sea tide, sea flow will push the gate to be closed to block the intrusion of the sea water, on the other hand, for a low sea tide, fresh water flow will push the upper part of the gate to be opened to release overflow of fresh water. For lower part of the gate, it can separately be lifted to release the sediments. In a case of serious flood, the whole gate can be lifted to release the overflow (Chirawate, 2005). Although new design of the gates is provided, the problems occurred are likely complicated and cumulative. This study therefore attempted to identify key stakeholders who should be involved in decision making, specify the actual problems occurred, and investigate the most feasible alternative to solve the problems.

MATERIALS AND METHODS

Stakeholder analysis (ODA, 1995) was applied to identify key stakeholders on their importance and influence regarding the case problem. Samplings of key stakeholders, 91 people according to Yamane (1973)'s sampling method, were asked for their opinions

towards problems occurred in the study area. Means of focus group discussion, questionnaires, and in-depth interviews were undertaken. The opinions were synthesized to define problems. Another discussions and interviews were undertaken with the key stakeholders to suggest alternative solutions for the problems. All suggestions were further synthesized to specify feasible alternatives for the case study. At the same time, experts from academic in relevant fields were also asked for their recommendations.

RESULTS AND DISCUSSION

From stakeholder analysis by importance-influence matrix (Figure 2), key stakeholders can be divided into internal and external key stakeholders (Table 1). Internal key stakeholders included local leaders, farmers and members of local cooperative who were important to the area in terms of living in and utilising the resources of the area and being directly able to obtain both positive and negative impacts from changes occurred in the area. Because of their good local knowledge of the area, theoretically, they can make their own decisions i.e. no additional information regarding the study area or existing problems is required. It must be noted that all local leaders and members of cooperative are also farmers. Their opinions regarding problems and management options therefore mostly reflected their concerns in terms of livelihood. External key stakeholders were usually the outsiders who influence current and future management of the area. Consequently, the government officers from irrigation section were classified in this category.

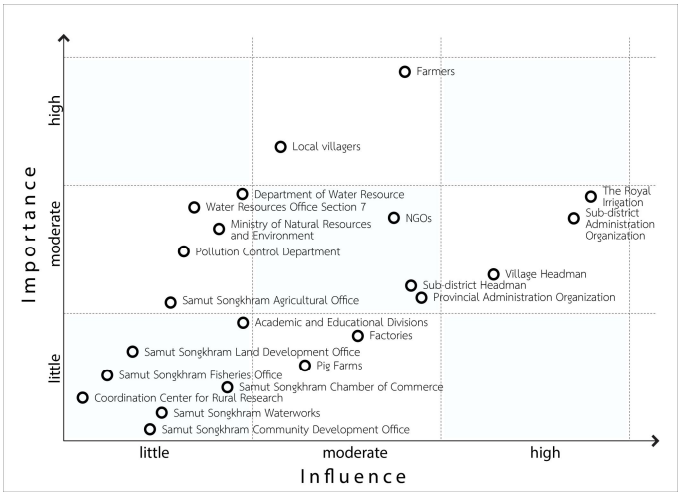

Figure 2 Stakeholder analysis by importance-influence matrix

Table 1 Key stakeholders.

Key stakeholders	Descriptions
Internal key stakeholders	- sub-district headman
	- village headman
	- members of local cooperative
	- paddy field farmers
	- orchard and vegetable farmers
	- shrimp farmers
	- snakeskin gourami fish aquaculture farmers
External key stakeholders	- government officers from irrigation section

According to key stakeholders' opinions, problems occurred in the area can be divided into water quantity problem, water quality problem, and water management problem. Many problems are linked, in particular, management problems closely associated with both quantity and quality problems. Table 2 shows that key stakeholders more concerned on water quality problem. Three most concerned problems are garbage and weed in the canals, toxic contamination from agriculture and the mis-control of the gates.

Table 2 Frequency and rank of suggestions regarding problems.

Problems	Frequency of suggestions	Rank
Garbage and weed in the canals (Quality)	80 (16%)	1
Toxic contamination from agriculture (Quality)	56 (11%)	2
Mis-control of the gates (Management)	50 (10%)	3
Less water in summer due to shallow canals. (Quantity)	44 (9%)	4
Water excess from discharge in rainy season (Quantity)	43 (9%)	5
Sediments behind the gates (Quality)	43 (9%)	5
Lack of local awareness on water conservation (Management)	35 (7%)	6
Lack of collaboration between responsible organizations (Management)	30 (6%)	7
Toxic contamination from industries (Quality)	28 (6%)	8
Water shortage in summer (Quantity)	28 (6%)	8
Inadequate water because of water competition among different activities (Quantity)	27 (5%)	9
Damaged gates (Management)	26 (5%)	10
Inappropriate irrigation construction (Management)	12 (2%)	11

From the defined problems, key stakeholders were asked to suggest alternatives for solving each problem. It was apparently found that some suggested alternatives can solve more than one particular problem. Therefore, a set of initial alternatives was re-categorised on the focused issues as summarised in Table 3.

Table 3 Initial alternatives suggested by key stakeholders.

Focused Issues	Alternatives
Gates and control	- Undertake appropriate period and amount of water discharging from the gates.
	- Do not allow discharge in rainy season.
	- Change design of the gates to the local design.
	- Allow water flow naturally (abrogate all use of the gates).
	- Regularly undertake maintenance.
Waste and sediments	- Regularly remove sediments from the canals.
	- Open of the gates through to clean up the sediments once a year.
	- Allocate appropriate area for leaving the removed sediments.
	- Do not allow garbage in the canals.
	- Promote local awareness on waste disposal.
	- Do not allow sewage released into the canals especially in summer.
	- Promote local awareness on agricultural chemicals application.
	- Control quality of sewage before discharging into the canals.
	- Restrict law enforcement about waste disposal.
Collaboration	- Promote collaboration among the responsible organizations when opening or shutting the gates.
	- Coordinate with the irrigation officers to discharge appropriate amount of water especially when drought.
	- Arrange a forum for discussion between government representatives, locals and private organizations in the area.
	- Constantly distribute news to the locals.
	- In case of planning new project, initial study of actual situation in the area as well as stakeholders' requirements should be undertaken before making any decision, in addition, participation between responsible organizations and locals should be promoted in the decision making.

With respect to issue regarding the gates, options needed further evaluation included (1) abrogate all built gates and allow water flow naturally; (2) keep all built gates but improve the operation i.e. undertake appropriate period and amount of water discharging from the gates; (3) change the design of the built gates to other standard design, for example, weir gates or gates that can open the upper part to release some overflow; (4) change the design of the built gates to the locals' design which could also be adjusted for each canal. From the results (Table 4), fresh water users like paddy field farmers and orchard and vegetable farmers and also brackish water users (shrimp farmers) highly preferred to change the design of the built gates to the locals' design (option 4). Snakeskin gourami fish aquaculture farmers, on the other hand, preferred to keep all built gates but required improvement of the gates operation (option 2) which was consistent to the government officers' opinions. From the experts' recommendations, for rarely used canals, the gates were considered unnecessary.

Table 4 Frequency of suggestions regarding preference on the gate options.

Key stakeholders (categorized by occupations)	**Frequency of suggestions**			
	Option 1	**Option 2**	**Option 3**	**Option 4**
Paddy field farmers	2 (11.76%)	9 (20.93%)	0 (0.00%)	11 (20.75%)
Orchard and vegetable farmers	1 (5.88%)	1 (2.33%)	0 (0.00%)	1 (1.89%)
Shrimp farmers	8 (47.06%)	18 (41.86%)	5 (62.50%)	29 (54.72%)
Snakeskin gourami fish aquaculture farmers	6 (35.29%)	12 (27.91%)	2 (25.00%)	11 (20.75%)
Government officials	0 (0.00%)	3 (6.98%)	1 (12.50%)	1 (1.89%)
Total	17 (100%)	43 (100%)	8 (100%)	53 (100%)

Remark it was considered on the fact that all local leaders and members of cooperative were farmers; therefore, they were categorized according to their agricultural activities.

For further evaluation on the issue regarding waste and sediments, Table 5 shows that the majority of stakeholders suggested an encouragement to use more bio-chemicals in the agricultural activities to solve toxic contamination from agriculture while preferred to restrict law enforcement about waste disposal for toxic contamination from industries. For garbage and weed problem, most of key stakeholders preferred to promote local awareness on waste disposal. In addition, the majority of stakeholders suggested to undertake regularly operation on the sediments removal from the canals.

Table 5 Frequency of suggestions regarding preference on waste and sediments issue.

Focused Issues	Frequency of suggestions as first priority	Alternatives	Frequency of suggestions
Toxic contamination from agriculture	39 (33.33%)	- Regularly monitor the use of chemical substances among farmers.	21 (33.33%)
		- Encourage the use of bio-chemicals.	38 (60.32%)
		- Promote collaboration between farmers to reduce waste water from shrimp farms and pig farms.	2 (3.17%)
		- Discharge fresh water to dilute if not clean up the water.	2 (3.17%)
Garbage and weed	33 (28.21%)	- Obstruct expansion of garbage and weed by e.g. using wood stick.	20 (31.75%)
		- Promote local awareness on waste disposal.	42 (66.67%)
		- Apply chemicals to eliminate the weed.	1 (1.59%)
Toxic contamination from industries	29 (24.79%)	- Arrange a forum for discussion between government representatives, locals and private organizations in the area.	23 (46.94%)
		- Restrict law enforcement about waste disposal.	26 (53.06%)
Sediments	16 (13.68%)	- Regularly remove sediments from the canals.	30 (66.67%)
		- Open of the gates through to clean up the sediments once a year.	15 (33.33%)

With respect to the issue regarding collaboration, the suggestions were consistent that collaboration among relevant organizations and the locals in water management is essential. Activities with varied degree of collaboration were suggested in Table 3. The experts also recommended that, for non-technical activities, the locals should be authorised to take more responsibility in management, while for some high technical procedures such as constantly monitoring water quality, the governments and also industries should be responsible. This supports findings regarding keys to the succession in conflict resolution of Mongkol et al. (2012) and Pratheuangrattana (2013).

CONCLUSIONS

Phrak Nam Daeng community, Samut Songkhram province, Thailand has collectively experienced serious water conflicts between fresh water, brackish water and salt water users. This research thus investigated actual problems as well as feasible alternatives for solving the conflicts by taking into account key stakeholders' opinions. Farmers, local administrations and the government officers from the irrigation section were assessed as key stakeholders. Evaluation results presented that garbage and weed in the canals, toxic contamination from agriculture and the mis-control of the gates were three most concerned problems. Suggested alternatives involved three main issues i.e. the gates and control, waste and sediments, and collaboration among stakeholders. Different stakeholders preferred different gate options but some agreements were found on alternatives to solve waste and sediments problems. More importantly, most of stakeholders focused on alternative regarding collaboration between responsible organizations and locals in decision making on water management in the area.

Although a final solution fully acceptable to all stakeholders could not be provided, the research did succeed in demonstrating methodology to identify stakeholders and involve them in defining problems and selecting the feasible alternatives for the case study. Findings are worthwhile as a foundation for integrated water management in the case study. In addition, the demonstration of implementing the developed methodology itself could help tackle the water conflicts management in other area.

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