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วารสารความเป็นธรรมทางสังคมและความเหลื่อมล้ำ

การจัดการทรัพยากรน้ำโดยชุมชนมีส่วนร่วมในพื้นที่ภาคเหนือของประเทศไทย

Community participation in integrated water resource management in northern Thailand

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บทคัดย่อ

ปัญหาปริมาณและคุณภาพน้ำ เป็นปัญหาที่ประชากรชาวไทยต้องเผชิญหน้ามาหลายสิบปี ภาคเหนือของประเทศไทยเป็นพื้นที่ต้นน้ำของลุ่มน้ำหลักของประเทศ อันประกอบด้วยลุ่มน้ำปิง วัง ยม และน่าน ในการศึกษาครั้งนี้ ได้คัดเลือกพื้นที่ศึกษา ได้แก่ ชุมชนบ้านแม่ละอุป จังหวัดเชียงใหม่ ชุมชนบ้านแม่เชียงรายลุ่ม จังหวัดลำปาง ชุมชนบ้านผาตั้ง จังหวัดพะเยา และชุมชนบ้านดงผาปูน จังหวัดน่าน อันเป็นตัวแทนของลุ่มน้ำปิง วัง ยม และน่าน ตามลำดับ จากลักษณะทางภูมิประเทศที่แตกต่างกัน แต่ละชุมชนจึงบริหารจัดการเพื่อแก้ปัญหาน้ำที่มีลักษณะเฉพาะที่มีความแตกต่างกัน ชุมชนบ้านแม่ละอุป ตัวแทนลุ่มน้ำปิง

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ซึ่งเป็นที่ลาดชัน ประสบปัญหาน้ำท่วม-น้ำแล้งและไฟป่าตามฤดูกาล และมีการแก้ปัญหาโดยการออกแบบฝายชะลอน้ำที่เรียกว่า “ฝายสามชั้น” ซึ่งเป็นฝายที่มีบทบาทเป็นแนวกันไฟเปียกอย่างมีประสิทธิภาพ ส่วนชุมชนบ้านผาตั้ง ตัวแทนลุ่มน้ำยม ประสบปัญหาน้ำหลากและการชะล้างพังทลายของหน้าดิน จึงมีการสร้างฝายภูมิปัญญาโดยใช้วัสดุที่มีอยู่ในพื้นที่มาสร้างฝายขนาดเล็กจำนวนมาก เพื่อช่วยลดความแรงของน้ำหลากที่เป็นมิตรต่อสิ่งแวดล้อม ส่วนชุมชนบ้านแม่เชียงรายลุ่ม ตัวแทนลุ่มน้ำวัง และชุมชนบ้านดงผาปูน ตัวแทนลุ่มน้ำน่าน ประสบปัญหาการตัดไม้ทำลายป่า ซึ่งนำไปสู่ปัญหาภัยแล้งและดินโคลนถล่ม จึงมีการแก้ปัญหาโดยการสร้างฝายภูมิปัญญาที่ใช้วัสดุในท้องถิ่น เป็นจำนวนมากตามแนวความลาดชันของภูเขา ละมีโครงการสร้างจิตสำนึกในการปลูกป่าเพื่อฟื้นฟูป่าให้เป็น “ป่าเปียกบนพื้นที่สูง” เพื่อช่วยลดปัญหาในพื้นที่ นอกจากกิจกรรมของผู้ใหญ่แล้ว การสร้างจิตสำนึกให้กับเยาวชนและการให้เยาวชนมีส่วนร่วม จึงเป็นการแก้ปัญหาในระยะยาวตามหลักการของการพัฒนาสิ่งแวดล้อมอย่างยั่งยืน

คำสำคัญ: การมีส่วนร่วมของชุมชน; ทรัพยากรน้ำ; ฝายชะลอน้ำ

Abstract

Thai people have faced quantitative and qualitative issues related to water usage for decades. The northern region of the country is the main headwater of Thailand where the Ping, Wang, Yom, and Nan Rivers are the main watersheds. The heads of those four rivers are extremely important. Four communities, namely Mae La Oop (Chiang Mai Province), Mae Chiang Rai Lum (Lampang Province), Pha Tang (Phayao Province), and Dong Pha Poon (Nan Province), have been selected as case studies as they are located within the Ping, Wang, Yom, and Nan watersheds, respectively. Each watershed is located in a different geographic area. These respective communities typically assess and manage their own water usage issues through various management practices. The Mae La Oop community, as representative of the Ping watershed, has addressed seasonal droughts and incidences of flooding by designing and constructing three-layer check dams. These check dams work as a type of “wet firebreak” in containing areas prone to forest fires. The Pha Tang community, as representative of the Yom watershed, has had to face flooding and soil erosion problems that arise during the rainy season. Local people have constructed a number of local material-based check dams to address these problems in an environmentally friendly manner. The Mae Chiang Rai Lum community located within the Wang watershed and the Dong Pha Poon community in the Nan watershed have faced severe logging problems that have led to droughts and landslide problems. The local people have constructed a number of low cost and local material check dams along these mountainous slopes and have created an effective forest restoration project. The creation of a “highland wet forest” has helped to address these problems. At present, the

activities of both locally residing adults and teenagers are being encouraged to be performed from an environmentally sustainable approach.

Keywords: Community; Participation; Water resources; Check dam

Introduction

Thailand is located in the Southeast Asian region in what is known as the Indochina Peninsula. Thailand's climate is tropical with three distinct seasons: a hot season from March to mid-May, a rainy season brought on by the southwest monsoon which generally runs from mid-May to October, and a dry and relatively cool season from November to February when the northeast monsoon, originating from the Asian continent, prevails. Similar to the inhabitants of other countries that are located in tropical zones, Thai people face water-related seasonal problems throughout the year. Every year, the six-month rainy season is known to cause damage to huge areas located in northern, central, and southern Thailand in the way of flooding, whilst periods of extreme drought often arise during the three dry months of the hot season when areas of the northeast and the north are often affected. Thailand is recognized as an agricultural country. Approximately 34% of the total population of the country are farmers (agriculturists)(Agriculture and Fisheries Branch, 2017) Therefore, drought and flooding are recognized as two of the most important national problems for this sector of society. Specific geographic information pertaining to river length, watershed areas, and annual precipitation (Table 1) of the four watersheds are presented below.

Table 1 Geographic information of the Ping, Wang, Yom, and Nan watersheds.

	Watershed			
	Ping	Wang	Yom	Nan
Length (kmX	715	460	735	740
Watershed area (sq.km)	34,534	10,793	24,047	34,682
Annual precipitation (mm)	1,132	1,100	1,204	1,287

Sources: Thai Water: https://tiwrm.hii.or.th/web/index.php, 2020

This project was initiated with the participation of university researchers, government organizations, hydro and agro informatic institutes, and members of local communities. The project aimed to use scientific and technological applications to solve or at least minimize the water-related problems experienced in the four areas of northern Thailand. These include the upstream areas of the four main rivers, namely the Ping, Wang, Yom, and Nan Rivers. In addition, community forest

practices and youth activities were also included in the process of implementation, whilst environmental awareness was promoted among the populations of these communities in order to establish sustainably transferable outcomes after the project will end.

Methods and Materials

In this project, university researchers played an important role as academic advisors. The main goals of the project were discussed, shaped, and designed in conjunction with community members, university researchers, and local government officials. The project procedure was run in a step-by-step manner as follows.

Community selection criteria

With regard to the four main river basins of Thailand, one active and one successful community were selected from each river basin area to be included in this study. The main criteria consisted of the following: 1) being located in an area experiencing incidences of both droughts and floods, 2) being located outside the national irrigation area, 3) areas that were home to low-income communities, and 4) areas with community members that are dedicated to environmental awareness and practices.

Participatory project planning

Meetings among university researchers, hydro and agro informatic institute researchers, and community leaders were conducted at each community location. The area analysis included geographic details, information pertaining to balanced water management practices (water budget and water demand), forest cover, soil types, agricultural activities, and other relevant water usage-related issues. Accordingly, data were collected and analyzed for the next step of the project.

Data collection

The Man survey and the Geographic Information System (GIS) survey were used to obtain the GIS position and slope of each area. General information pertaining to agricultural activities, the attitudes of local people, and the history and background of each community were obtained through direct interviews. Annual precipitation data were collected from the Hydro and Agro Informatics Institute Report (Hydro and Agro Informatics Institute, 2017) Hydrologic data, including information pertaining to water levels, velocity, depth, discharge, width, and substrate types of the streams, were collected seasonally *in situ*.

Implementation

After obtaining all relevant data, water resource management policies were designed and constructed. Mountain irrigation pipelines, check dams, ponds, and water storage areas were constructed based on the needs of each community and according to relevant geographical, ecological, and hydrological criteria (Castillo, Perez, & Gómez, 2014 and Pichai Saranrom, 2011).

Appropriate community forest and youth environmental activities were also developed for optimal local community utilization and environmental awareness.

Results

After conducting field surveys and dedicating exhaustive consideration to the results, four communities were selected, specifically the Mae La Oop community of Chiang Mai Province located in the Ping Watershed, the Mae Chiang Rai Lum community of Lampang Province located in the Wang Watershed, the Pha Tang community of Phayao Province located in the Yom Watershed, and the Dong Pha Poon community of Nan Province located in the Nan Watershed (Figure1) .

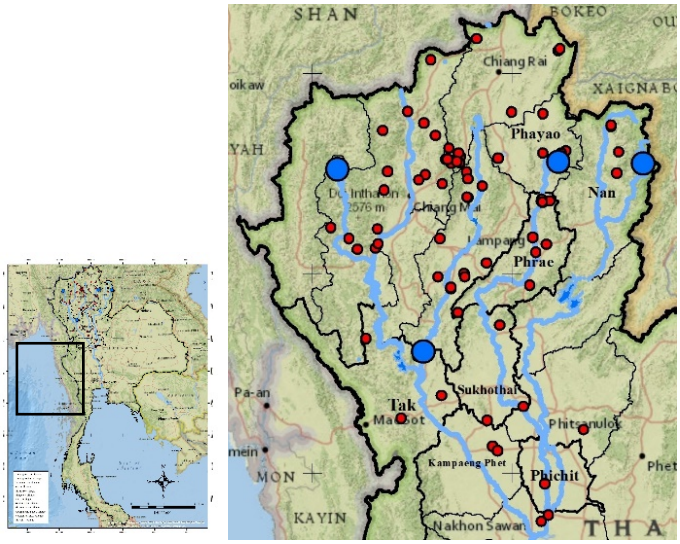

Figure 1 Map of Thailand with selected communities located in the Ping, Wang, Yom, and Nan Watersheds (indicated by blue circles from left to right).

After conducting field surveys and dedicating exhaustive consideration to the results, four communities were selected, specifically the Mae La Oop community of Chiang Mai Province located in the Ping Watershed, the Mae Chiang Rai Lum community of Lampang Province located in the Wang Watershed, the Pha Tang community of Phayao Province located in the Yom Watershed, and the Dong Pha Poon community of Nan Province located in the Nan Watershed (Figure1).

According to the section pertaining to the methodology of this study, particularly in sections 2.2 and 2.3, meetings and discussions among researchers, community leaders, and community members were conducted. The outcomes of these meetings revealed that the four selected communities have been facing incidences of drought during the dry season along with floods at other times of the year as is presented in Table 2.

Table 2 Annual water problems occurring in the four selected communities.

Mae La Oop	Mae Chiang Rai Lum	Pha Tang	Dong Pha Poon
Droughts and flooding in areas without water storage	Droughts and soil erosion in areas with sandy substrates	Flooding during the rainy season in areas with soil erosion	Droughts in areas without water storage

According to geographical, ecological, and hydrological data analysis, integrated water resource management practices were discussed and designed. These practices focused on how to solve the current water problems based on area data and the potential community benefits.

Figure 2 Concrete water storage unit

Mae La Oop Community (Ping Watershed): eight rock check dams were constructed along the stream. Additionally, connecting pipelines were laid to join irrigation ponds to the newly constructed concrete storage units (Figure 2). These systems were then used for agricultural and household purposes. Accordingly, 1,230 residents have received benefits from this project. Consequently, there has been enough water for household use for all members of the community.

Mae Chiang Rai Lum Community (Wang Watershed): ten rock-bamboo check dams (Figure 3) were constructed along the upstream areas of stream tributaries according to increases

in humidity levels of riparian areas of the stream, whilst three concrete-bamboo check dams were constructed downstream for the purposes of water storage. The stored water was then used for agricultural purposes. Accordingly, 1,200 residents in 293 households have received benefits from this project. Furthermore, greater amounts of water and higher humidity levels were observed in huge forest areas resulting in higher degrees of biodiversity in these areas.

Figure 3 Rock-bamboo check dam

Pha Tang Community (Yom Watershed), five onsite material check dams were constructed by local people with generous assistance from the officers of the Doi Phu Nang National Park. These check dams are now being used for community forest and agricultural purposes. Collaboration between residents, university researchers, and national park officers has generated friendly relationships among the different groups of individuals with greater attention being paid to green and moisture forest outputs.

Dong Pha Poon Community (Nan Watershed), two old concrete check dams and two old rock check dams were re-constructed, along with three new rock check dams. Additionally, five concrete water tanks were constructed. These water supply systems are now being used for agricultural and household purposes. After implementation of the project, the residents may still occasionally encounter periods of drought with higher levels of humidity in their community forest areas.

Environmental Awareness of Youth Activities

Members of the younger generation of each community joined in discussions with adult residents and university researchers for the purposes of planning a range of environmental/ecological activities. University researchers and national park staff joined together to create ecological/biodiversity workshops that aimed to educate and train local youths and adults on

how to create their own projects for the conservation of natural streams and forest areas. Many of the youths from each community planned and initiated forest restoration projects. Thousands of seedlings of native trees have been prepared for planting in forests where the adult projects pertaining to water resource management were conducted. Long-term water and tree growth monitoring projects have been carried out with the participation of adults, youths, and local government officials in each community.

Discussion and conclusion

According to the activities of these projects, the communities earned financial support from the localized government and academic support from university staff. Many of the water problems have been solved or at least minimized by these projects, while not all community members have actually realized all of these benefits. However, local people have learned how to manage natural resources with limited financial support. Furthermore, university researchers witnessed the importance of effective communication. Different ways of living, different academic levels, and different spoken languages were some of the problems associated with the implementation of this project. But it is understood that those problems could be minimized with displays of sincerity and trust by all parties, which would then allow the project to go on.

The key success of this participatory integrated watershed management project is that it has promoted concepts of effective understanding, approach, and development, all of which have been promoted and supported by King Bhumibol. Accordingly, local community members and researchers must clearly understand the geographic characteristics and basic needs of the community. Subsequently, the appropriate approach must be followed. After the implementation of those concepts, sustainable development initiatives can be fully embraced. Additionally, continuous collaboration must take place between local communities (both adult and youth residents), government organizations (Hydro and Agro Informatics Institute, National Park staff, and local government officials), and university researchers. This collaboration can then be effectively run-in accordance with ecological, scientific, technological, and indigenous living concepts.

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