

Thailand's Experience and Lessons Learnt on Watershed Management

An Overview

Consultancy Report

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Thailand's experiences and lesson learnt on watershed management : An overviews

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Executive summary

The watershed has been accepted locally and internationally as an important concept for the systematic protection, management and utilization of natural resources and the environment. Watershed resources such as land, forests, wildlife, and water are diverse and are related to each other in complicated ecosystems. Local tradition and culture play an important part in linking people and ecosystems in a coexistence. This paper defines watershed management as the management of land and land-related resources to ensure a politically and environmentally acceptable quantity and quality of water and its availability over time. This implies that the amount of available water should be appropriate and its quality good enough that it will not negatively affect the quality of life upstream or downstream in the watershed.

For more than five decades, Thailand has been involved in developing watershed concepts and practices both through its own efforts and in cooperation with international organizations. Many development schemes have attracted international interest and have been visited by both Thais and people from overseas. Important academic works derived from watershed development, i.e., Participatory Land Use Planning and Upstream-Downstream Conflict Management, has been produced, and many projects have been internationally recognized as distinguished development projects. Lessons and experience related to watershed management, particularly concepts and practices in building community capacities and people's participation, have also been gained. These tools help strengthening local people and organizations. It is thus clear that the development of state policies and laws cannot overlook the role of local people, and this is seen in the drafted community forest acts, water resources acts and other public policies.

However, the experience and lessons related to watershed management have been limited to the duration of the project and the local level. Also, the knowledge and experience have been mostly tacit; they are not passed on to other persons. Little has been recorded, and what has is only in official forms of record such as progress and technical reports, but these are not sufficient for sharing and learning on a wider scale. As time goes by, this knowledge and experience will be lost. The exchange of the selected Thai watershed management experience and lessons learned with other countries will be beneficial so as to preserve the knowledge and experience and make it possible to use them, particularly by the countries of the Mekong region.

This paper provides situational analyses and suggests a variety of experiences and good practices relating to watershed management in Thailand in thematic categories (basic watershed management; policies, laws and organizations; planning; implementation; monitoring and evaluation) at different administrative and management unit levels (watershed, local community, provincial and national). The selection of experiences and best practices has been based on the following four criteria: 1) outstanding case/issue and widely recognized by the public no matter whether successful or not, 2) action and observable activities 3) availability of data, information, documentation and

contact persons, and 4) suitability for sharing and learning by others. It is expected that the selected best practices briefly described in this paper will promote the exchange of experience and knowledge, and it will also provide the opportunity to learn from the successes and failures so that mistakes will not be repeated.

Based upon the above four criteria, over sixty best practices were chosen. Each has its own identity based on its background environment and practices. Preliminary analysis shows that experience gained and lessons learnt from best practices in watershed management in Thailand related to both internal and external factors on each particular case. The internal factors are the abundance of the natural resource base, traditions, culture, community leaders and community participation while the external factors are related to national policies and laws, government support systems, and international cooperation. In considering any successful practices for use, the context, conditions and processes of the success should be clearly understood. Recommendations to increase sharing and learning of selected experiences and best practices are as follows:

1. **Documentation and analysis of experience and best practices:** One or two of best practices in each category should be selected according to project's focus for thorough documentation and analysis. The documentation should reflect the situation, issues, content, processes, problems and their management, as well as experience and lessons acquired.

Name list of best practices recommended are:

National level: Drafted National Water Resources Acts, Drafted Community Forest Acts, Environmental Funds, Community Master Plan for Sustainable Development, Mae Klong–Chao Phraya Water Diversion Project and River Investigators Project

Provincial level: Prathumthani Water Supply Project by a private enterprise, Surin Organic Rice Network, and Hug Muang Nan Network

Community level: Ban Lad Yasothon Group for Herbs, Thung Yao, Khao Phaeng Ma , Nong Leng Sai and Prage Nam Dang Communities

River Basin level: Mae Ta Chang, Mae Wang, Kud Kha Keem, Nam Choen, Dong Natham, Thamayatra, Moon rivers

2. **Development of guidelines to facilitate learning processes concerning best watershed practices:** These guidelines will elaborate in detail how to develop learning processes from different best practices such as participatory land use planning, savings groups, water uses conflict management, etc. The guidelines will be of great benefit for facilitators working in the pilot watershed areas in each country.
3. **Arrangement of study trips to best practice sites.** If it is financially feasible, study trips should be conducted to enable community leaders and officers to visit and share experiences with the communities directly.

Introduction

The watershed has been accepted as an important system and concept in the protection, management and utilization of natural resources and the environment. Major watershed resources such as land, forest, wildlife, and water interact with each other in complicated ecosystems. Local tradition and culture play an important part in achieving balance in the relationships between people and ecosystems in a sustainable way.

Thailand has been involved in the development of watershed concepts and practices for over five decades. Many efforts have been recognized locally and internationally. Although, the watersheds of the country have encountered many problems, considerable progress has been made. Many obstacles found in the area of watershed management in Thailand are similar to those found in its neighboring countries. The problems involve conflicts over the land, forest and water use. What Thailand has learned and its experience will probably be beneficial to watershed management in the region.

However, the lessons Thailand has learned and the experience gained have been limited to the local area and the project level only. Throughout almost half a century of watershed management experience, exchanges of knowledge have been limited and experience and most of the findings have not been properly analyzed and synthesized; indeed, some of this knowledge remains only in the memories of those involved. As a result, the knowledge and experience relevant to watershed management in Thailand and in the Mekong region tends to be of little avail.

From a regional perspective, the development of the management of the Mekong watershed should no longer be a trial-error process. It must be based upon knowledge and experience gained from field implementation. It is necessary to select relevant watershed experience and practices of various categories and levels to benefit present practice in Thailand as well as countries in the Mekong region.

This article aims to review the watershed management background and situation in Thailand and recommend best practices related to watershed management in thematic categories (basic watershed management; policies, laws and organizations; planning; implementation; monitoring and evaluation) at different of administrative and management unit levels (watershed, local community, provincial and national) for further planning of documentation, analysis/synthesis, exchange and dissemination.

Background

In the past, the way of life in communities in Thailand was similar to the ways of life of people in other tropical countries. People regarded everything in their environment as relating to their everyday life, i.e, they had a holistic view of soil, water, forests, wildlife and themselves all merged in their way of life and all to be taken care of in compliance with customs and traditions (Pra-Thammapidok, 1994). For example, in making settlements. They designated lands for houses, for agriculture and for forest. When making use of water, they managed it by building simple irrigation systems. When they wanted to cultivate crops, they had to maintain soil fertility and acquire adequate water. When collecting forest products, they had to care for the forest. Thus, the watershed was traditionally managed to sustain natural resources for the way people lived (Nakabutr, 1993 and Sathienrathai, 1994).

Watershed management as a technical discipline was begun in Thailand approximately five decades ago with the assistance of international and academic organizations. At the beginning, the emphasis was on forests and wildlife. However, the country came to be faced with frequent floods and droughts. It was noticed that flood water from the North was reddish because of the silt suspended in it, and the conclusion was reached that all of these phenomena were related to vast deforestation. Highland people were blamed for clearing forest land in order to expand their cultivation area. This drew to the attention of the academics, and they became interested in gathering information and knowledge on water as an index to indicate the efficiency of watershed management and of multi-purpose forest management (Tongpan, 1990).

However, no means was found to combine the watershed management with forest management because, at that time forest, management focused on timber production and logging. Forest protection related laws were enacted to protect the forests, but they were not effectively enforced. When a new-generation forest conservation officers with new concepts entered service in the Royal Forest Department, forest conservation and multi-purpose forest projects were initiated. Timber-focused forest management gave way to multiple-used forest management, and forest utilization and forest conservation were combined. Due to the rapid rate of forest land conversion, the government had to permit deteriorated forest land to be put to other uses. Measures were sought to conserve soil and water. This gave rise to integration of the watershed management approach into forest development plans.

The development of the watershed management approach can be divided into three stages: the pioneer stage, the development stage, and the participation stage.

Pioneer stage

This stage involved soil and water conservation and reforestation of watershed forests and included the initiation of watershed research stations.

In 1952, forest stations for watershed protection were established to protect watersheds and to experiment on soil and water conservation measures with various crops on the mountains in the North. Experiments were conducted with native and exotic crops and

plants, such as pine and temperate fruit trees. In 1958, research stations for soil conservation were established. Measurement of stream sediments was initiated so as to monitor the impact of deforestation. In 1963, forest stations for watershed protection were changed into research stations for watershed conservation (Komkris, 1962). The approach was changed from reforestation to research on watershed protection and conservation. During this period, Kasetsart University signed an agreement with the University of Hawaii, USA, concerning technical assistance in watershed management, and a watershed pilot project with new concepts and approaches was initiated.

In 1965, the first reservoir at Doi Chieng Dao was built as a water gauge to investigate the relationship between topography, drainage systems, and soil erosion. This was the first systematic study of a forest watershed. Earlier in this period, a watershed management course was first introduced in 1959 in the Faculty of Forestry, but the course syllabus was not formally established (Department of Conservation, 1969).

The problems of watershed management were not seriously addressed during this stage. The authorities concerned realized that the existing watershed problems were complicated and that cooperation between the communities and the government agencies was badly needed (Faculty of Forestry, 1989). Experience was gained and lessons were learned in this period concerning communities' ways of life and local knowledge and traditional practices of ethnic groups in managing soil, water, and forest.

Development stage

In this stage, watershed research on forest hydrology and forest ecology was developed intensively at Huay Kok Ma, a small watershed in Doi Suthep-Doi Pui area of Chiang Mai. Basic research included the balance of water and solar radiation (Chunkao, 1974; Ruangpanit, 1970; Makarabhirom, 1979). At the research center of Sakaeraj in Nakhon Ratchasima, studies on forest meteorology and the impact assessment on watershed land use in terms of ecological processes and water quantity/quality were conducted (Boonyawat, 1983; Chunkao, 1974; Khemnark, 1983; Niyom, 1983). Applied research on the land use planning was also conducted (Department of Conservation, 1986). Various studies on agriculture and natural resource management were integrated into watershed development schemes. Emphasis was on small-scale watershed research and pilot projects with systematic and comparative studies (Chunkao, et al, 1981; Chunkao et al, 1983).

The research was extended to the Royal Highland Watershed Development Projects in the North, and watershed analysis was initiated in different parts of the country (Tangtham and Aimphan, 1988). This resulted in the development of watershed databases and scientific knowledge for the watershed management. Various types of research work were published and disseminated in academic papers and theses. (See the selected publication recommended)

No matter how many research studies were conducted, the problems still increased, particularly conflicts between government officers and the local communities over land for the watersheds reforestation schemes. A lack of awareness of social relations and of interpersonal skills on the part of officers made it difficult to settle the conflicts.

Watersheds management became part of the national development agenda with the Fifth National Economic and Social Development Plan (1982-1986). The National Forest Policy was promulgated. The watershed concept was widely used as a management unit for hydrological studies and natural resource management with emphasis on land use planning, natural resource use planning, and pollution control. Water data were to be used as indicator of watershed resource utilization, and sediment movement data as an indicator of the highland watershed management. Also implemented during the Fifth Plan was the classification of Thailand's major watersheds. The Cabinet approved of the watershed classification of the Ping, Wang, Yom and Nan Rivers (Chunkao and Tungtham, 1986).

During this period, the government cooperated with international organizations in developing various watershed projects. The major ones were the Development of Diversified Forest Rehabilitation Project, Phu Luang in Nakhon Ratchasima, the Phu Wiang Integrated Watershed Management Project in Khon Khaen, and the Doi Sam Meun Highland Development Project, the Doi Viang Pha Highland Development Project, and the Doi Wawi Highland Development Project in the North.

Also included were the government-initiated watershed pilot projects of Mae Tang in the North, Sern in the Northeast and Klong Yan in the South. During this period, Thailand had opportunities to develop its concepts and practices, as well as participatory tools and techniques. Watershed management projects began to attract study visits by various interested groups from both Thailand and overseas.

In sum, this development stage was a search for knowledge and models for watershed management. Various pilot projects were established, but they were not applicable to other areas due mainly to constraints imposed by government policies and laws. Local communities have no right to manage their resources. Decentralizing natural resource and environment management decision making to local people and communities did not work. The rapid economic growth in early 1990s resulted in increasing conflicts over land and water use. However, a great deal of experience was gained and many lessons were learned. Participatory tools and techniques in watershed management were experimented with and developed. Networks of people in small watersheds in various parts of the country were formed during this stage.

Participation stage

This stage began with the promulgation of the present Constitution in 1997. Currently, watershed management no longer emphasizes forest plantation. Other factors are considered, namely water distribution, water pollution control, management of conflict concerning water use between upstream and downstream communities and among the public, agriculture, industry and service sectors. It has become obvious that besides forestry and engineering, other academic disciplines, such as economics, sociology, and anthropology play, significant roles in watershed management. Thailand has been divided into 25 major watersheds, a national water resource committee has been formulated, and 25 watershed sub-committees have been appointed. The management and administration of watersheds has concentrated on major watershed administration aiming to fulfill the need of water for all sectors, agriculture, industry, tourism as well as communities.

Nonetheless, problems related to watershed management continue and differ from place to place due to the situations and viewpoints of the stakeholders. The forest agencies view population growth as a main factor leading to forest loss in the highland watersheds, to drought and flood, and to low quality of water due to chemical residues. Human settlement and improper land use (mostly slash and burn cultivation) caused sedimentation in streams. Existing forest-related laws have put the emphasis on conservation of the protected areas, restoration of forests, and restriction of land use and community development. Irrigation authorities are interested only in water shortages and supplies and put the emphasis on engineering works, i.e., building dams and reservoirs. Communities believed that inappropriate government policies resulted in devastated cutting of big trees, building road network leading to the human settlement in the forest, and expanding agricultural land in the lowland and mountainous forest areas. The non-government organizations (NGOs) and local communities emphasize empowerment and an eco-cultural approach to natural resource management. The rights of people and local communities to protect and to make use of natural resources as prescribed in the Constitution have been cited; however, no laws have been enacted to endorse the rights of local people to manage natural resources.

Situations and Major Issues

The present constitution, which was promulgated almost ten years ago, is intended to ensure the fundamental rights and freedom of the people to live, to earn a living, to join with the government in developing policies, to monitor the government's exercise of power and government development projects. Also, it gives rights to communities, under certain acts, to conserve, to restore and make use of natural resources and biodiversity for their subsistence. However, no laws have been enacted to endorse these rights, while the former laws empower the authorities to control natural resources. Thus, the conflict over the laws and the rights of people in accordance with local tradition and custom is intensifying.

In retrospect, the problems of watershed management in Thailand are related to five major issues: human settlement, land, forest, agriculture and water.

Human settlement

Human issues have long been significant as a key to the success or failure of watershed management. The issues of settlement and nationality have led to a serious conflict in the highlands and country's border areas. According to a report of the Ministry of Natural Resources and Environment, there are 10,866 villages in and around forests (Ministry of Natural Resources and Environment, 2005). It is estimated that one million households live and earn a living in the forest areas without legitimacy. The unsettled conflicts concern the areas where the villages are located, cultivation areas, cultivation methods and community forests. Of particular concern are areas where people had settled before the government proclaimed them protected areas. According to the current laws and policies, people are not allowed to settle in areas that are abundant forest watersheds or those with high bio-diversity, sensitive ecological systems, or high archeological and geological value, or in areas where endangered species of wildlife and plants live. Community members argue that they have lived in such forbidden areas prior to the enactment of the laws and that certain research findings have endorsed their

claim that the people's way of living and tradition enhances the protection of the forest and bio-diversity. The draft of the community forest acts reflects the conflict between these two extremes. This controversial issue has not been settled yet.

Land

Land is another major issue in watershed management because the majority of country's cultivation land is misused and poorly distributed. Fertile land with adequate supplies of water is used for building construction and urban settlement. Another problem is that the land is deteriorating because of the bad cultivation practices and uncontrolled use of chemicals. According to one study, 70% of the land is inefficiently used and many farmers are landless. This limits the improvement of productivity of the land and of the allocation of land among farmers of the younger generation. These landless farmers are motivated to encroach upon the reserved forests for cultivation as well as for sale, especially forest land on mountains which can be used for tourism businesses.

Forest and its resources

According to the 2005 report of the Ministry of Natural Resources and Environment, during the past five years, that is between 2000 and 2004, Thailand lost 1.5 million *rai*¹ of forest land, or an average of 300,000 *rai* a year. The loss of forests in the North was immense even though the budget allocation for forest protection was increased annually—many thousand million baht² yearly. Moreover mining has polluted water, as in the case of the Kliti Creek in Kanchanaburi province and as found in Mae Tow of Tak province. Stone quarrying also causes water and air pollution and affects wildlife. There are 42,653 wetland areas in forest and non-forest zones covering 7.5 percent of the total area of the country (Office of Policy and Environmental Planning); these include canals, creeks, tributaries, rivers, lakes, swamps, seas, beaches and estuaries. Among them, canals, creeks, tributaries and rivers number 25,008, and lakes, ponds and swamps 14,128, and all of these are threatened by construction and land encroachment; they have become shallow and unable to retain water and are prone to overflowing during the rainy season.

Agriculture

The area for cultivation covers 160 million *rai*, or 60 percent of the whole country, but approximately 100 million *rai* is deteriorating because of unsustainable cultivation and of certain chemical residues. It is noteworthy that the import of chemicals exceeds 4-5 million tons a year, and the amount increases 10-15% yearly.

Watershed issues concern agricultural practice, especially in highland areas. At present, there are three main kinds of agriculture pattern:

¹ A Thai unit of land measure equal to 0.16 hectare, or 0.395 acre, or 0.0016 square kilometer; 1 hectare = 6.25 *rai*; 1 acre = 2.53 *rai*.

² The Thai monetary unit, which in recent years has been converted at 1 baht per US\$0.025 or 40 baht per US\$1.

1) **Traditional agriculture** Traditional agriculture can be seen in different forms. There is a rotational cultivation, where crops and plants of different species grow together in a cyclical manner (Bunpinun, 1993 and Tribal Research Institute, 1988). Agroforestry systems such as tea-based agroforestry, multiple-crop based agroforestry, home garden, and forest diversification are also common in forest watersheds. This traditional agriculture has been practiced in areas of high mountains, which are forest areas protected by law (Rerkasem and Rerksaem, 1997). This type of agriculture is dependant on rain water, neither fertilizers nor chemicals are used. Some patterns require area for rotating cultivation.

2) **Conventional agriculture** This is mainly the monoculture of a single crop or tree species. Improved varieties of plants, fertilizers, insecticides, and a large amount of water are required in this system. This type of practice causes soil erosion, soil degradation and chemical residues in natural water sources.

3) **Integration of traditional-modern agriculture** This is the combination of traditional and modern agriculture. Plants are grown permanently on the same land. Efforts have been made to minimize the size of the cultivation area and the use of chemicals and water. This is self-sufficient agriculture which is as yet practiced only to a limited extent.

The main concern is that the government does not recognize rotational cultivation and other cultivation patterns in forests, e.g., agroforestry and livestock raising, particularly in the protected forest areas. But the fact is that over 30 years of effort to develop sustainable agriculture as an alternative to rotational cultivation in highland watersheds has yielded no viable solution to the problems. The large-scale monoculture of cash crops, which is rapidly expanded in the watersheds, has a devastating impact on soil, water and the environment and has not yet been dealt with.

Water Resources

The average annual rainfall in Thailand is 1,630 mm, and the amount of water annually is 213,423 million cubic meters. All the reservoirs throughout the country can hold 72,630 million cubic meters, or 34.03 percent of total whole annual amount of water. The annual internal renewable water resource is approximately 1,845 cubic meters per head, which is less than the amount in neighboring countries. Thailand is still in the group of countries where water is still sufficient. Water quantity in terms of rainfall received is not serious problem. But the capacity of water resources tends to limit the development of agricultural production which requires a large amount of water (Mingsan, 2001). The Office of the National Economic and Social Development (2006) has said that the amount of water needed will double every 20 years.

The Water Resources Administration has strongly emphasized the supply of water in summer period. However, frequent shortages of water have arisen due to the intense economic activities no matter whether villages were upstream, midstream or downstream. The 2005 report revealed that 55 percent of all the villages suffered drought and that drought caused damage to two million households and 13.6 million *rai* of cultivation land. Total damages amounted to 7,500 million baht, that number rising to 10,000 million baht in some year. The government agencies responsible have also faced more problems, such as villagers' opposition to dam construction. The effect of the dam construction on the environment, particularly on forests and bio-resources has been enormous. Problems of water resource management in terms of water distribution

and people's participation have become a national concern. It has caused conflict among farmers themselves and between farmers and the government, and the conflict has intensified.

Apart from droughts, other problems in relation to water shortage, some of which have made the headlines of newspapers, include encroachment upon water resource areas, lack of water to extinguish forest fires, water pollution, and long-term flooding. Also in the headlines were other issues related to water, such as water recycling and the development of water-saving technology.

The government has made clear its policies on water resources. Prime Minister Thaksin Shinawatra, speaking at the conference on watershed management organized by the Department of Water Resources on 22 July 2003, announced that the Royal Irrigation Department would undertake projects to serve 103 million *rai* of farmland throughout the country in 2009 with a budget of 200,000 million *baht*. The Royal Irrigation Department proposed its strategy to include 4.12 million *rai* of land in irrigation areas and to increase reservoir capacity to 3,803 million cubic meters. The budget for these two projects amounted to 196,700 million *baht*. At present, the Department is conducting feasibility studies on 221 medium-scale projects and 20 large-scale projects (Kounkajorn et al, 2005).

Regarding water resources management, the Royal Irrigation Department has proposed more dam construction and various water diversion projects. Problems arose when water from the Mae Klong River was pumped into the Chao Phraya River and when water from the Nam Prom was put into the Nam Sern, for this affected the ecological systems in both Mae Klong and the Nam Prom. This issue also arose in the case of the Salween River and the Mekong-Chee-Mun Rivers. Problems also exist in irrigation management: the increase of irrigated fields, river diversion effects, and collection of water fee to improve service or access to water by the poor. There are also problems concerning the people's participation in the water resource management over the 25 watershed because since most chairman and members are government officers, participation of other stakeholders is limited.

It can be concluded that problems and situations concerning watershed management vary from region to region. In the North, conflicts over forests and water use have been serious while in the Northeast, water shortages are the most serious problems. In the central floodplain, land issues, water pollution, and water distribution problems are rather serious, while conflicts about whether land is to remain forest or to be cultivated prevail in the South. The severity of these problems in each of the regions of the country is illustrated in the table given below.

Severity of problems related to watershed management issues

Issues	North	Northeast	Central	South
People (community in forests)	***	*	**	***
Land	***	**	***	***
Forest & resources	***	**	**	**
Agriculture	***	***	***	*
Water uses				

· Upstream-downstream	***	**	*	*
· Rural-Urban	***	***	***	***
· Agriculture-industry-community	**	**	***	
· Household	**	***	*	*

*** very serious, ** moderately serious, * slightly serious, - little problem

Best practices

Criteria

To make more widely known the watershed management experience and practice in Thailand, best practices have been selected on the basis of the criteria given below:

- 1) outstanding case/issue widely recognized by the public no matter whether successful or not
- 2) action and observable activities
- 3) availability of data, information, documentation and contact persons
- 4) suitability for sharing and learning by others

Each experience or practice implies a set of practices that are observable in terms of the outstanding issues concerned, activities, information, publication as well as the potential for sharing and learning.

Selected watershed management (WSM) experiences and practices

Based upon the above four criteria, over fifty best practices were chosen. Each has its own identity based on its background environment and practices. The selected best practices related to watershed management in Thailand in thematic categories (basic watershed management; policies, laws and organizations; planning; implementation; monitoring and evaluation) at different administrative and management unit levels (watershed, local community, provincial and national). A Name list of selected watershed management (WSM) experiences and practices is seen below.

	National	Provincial/ District	Local (community, village)	Watershed/ River basin
Basic WSM	1.Publications by Faculty of Forestry, K.U., WS Research station (MaeKlong, Rayong etc.	2.Watershed rehabilitation, Hug Muang Nan Network, 3.Watershed Rehabilitation Songkhla Lake	4.Upper Ping watershed (Chiang Dao)	5.Participatory WSM, Mae Wang, Chiang Mai
Policy and law	6.Cabinet decisions on watershed classification 7.Draft Water Act 8.Policy	11.Water privatization (Patumthani Water Supply Company)	12.Organic Agricultural Network, Surin 13.Mae Chaem, Chiang Mai	14.Conflict management, Mae Ta Chang, Chiang Mai

	National	Provincial/ District	Local (community, village)	Watershed/ River basin
	<p>guidelines on water management for Thailand</p> <p>9.Environment Act</p> <p>10.Draft Community Forest Act</p>			
Organization/ Institution	<p>15.National Committee on Water Resources</p> <p>16.National Forest Policy Committee</p> <p>17.Environmental Fund</p> <p>18.National Network on the Environment</p>	<p>19.Community rice mill, Kud Chum, Yasothon</p> <p>20.Chemical-free rice network, Nakorn Sawan</p> <p>21.Community Stone Dike, Nong Doo</p>	<p>22.Herbal Medicinal Group, Tha Lad, Yasothorn</p> <p>23.Forest Mgt for food security, Dong Keng CF network, Roi-Et</p> <p>24.Tung Yao CF women group, Lum Poon</p> <p>25.Forest for Water, Ban Lang CF, Rayong</p>	<p>26.Local resource management, In-Pang Youth group, Sakonnakorn</p> <p>27.Wetland management, Kud Ka Keem, Surin</p> <p>28.Local watershed administration, Prachinburi</p>
Planning	<p>29.Watershed Master plans</p> <p>30.Water grid system</p> <p>31.Community master plan for self reliance</p>	<p>32.Land use planning, Mae San, Loei</p> <p>33.Integrated forest & agri management, Nam Kian, Nan</p> <p>34.Integrated WSM, Pato, Chum Porn</p>	<p>35.Integrated planning, Lower Songkhram river basin, Sakonnakorn</p> <p>36.Restore ecosystem, Khao Pang Ma, Nakorn Ratchasima</p>	<p>37.Participatory landuse planning, Nam Choen, Chaiyapum</p>
Implementa- tion	<p>38.Eastern region watershed</p> <p>39.Mae Klong-Chao Pra Ya water diversion</p>	<p>40.Integrated WSM Hug Muang Nan network</p> <p>41.Assisted natural regeneration, Dong Yai CF, Amnarjaroen</p> <p>42.Wetland management, Nong Leng Sai, Pra Yao</p>	<p>43.Ban Sam Kar, Mae Tha, Lum Pang (Debt)</p> <p>44.Sustainable forest products management, Ban Chad, Ubon Ratchatani (NRM)</p> <p>45.Ban Nong Kae-Suan Sawan, Srisaket (local irrigation)</p> <p>46.Conflict management on water use, Prag Nam Dang, Samut Songkram</p> <p>47.Kan Thu Ree Swamp forest,</p>	<p>48.Protected area management, Dong Na Tam, Ubon Ratchatani</p> <p>49.Forest fire management, Mae Khan, Chiang Mai</p> <p>50.MaeTaChang, Chiang Mai</p>

	National	Provincial/ District	Local (community, village)	Watershed/ River basin
			Surat Thani	
Monitoring and evaluation	51.River Investigators Project, Green World Foundation 52.River conservation, Thachin	53.Water investigators, Surat Thani (Youth group)	54.Water pollution investigation, Pong River, Khon Kaen	55.River investigation, Upper Ping Watershed, Chiang Mai 56.Nature Walk, Mun river

Brief explanation of the selected best practices is given as follows (with symbols elaborating order of the river, size of the watershed and the impact assessment: 1=major river, 2=tributary, L=Large watershed, M=Medium watershed, S=Small watershed, Y=Yes, U=Unknown, N=No)

Basic Watershed Management

Basic watershed management knowledge (case 1) can be divided into two areas: academic and community. The academic area involves concepts, theories, and principles in WSM. The publications are limited in number and used by the Department of Conservation, Faculty of Forestry, Kasetsart University. Research papers of the watershed research stations, particularly in Huay Kog Ma, Mae Klong, Rayong etc emphasizing forest hydrology, forest and wildlife management and other bio-physical characters are also included. Despite the fact that some textbooks have been criticized as being derived from textbooks written and published overseas, they are the only source that can be found. There are some extension materials published by the Environmental Quality Promotion Department and the National Park and Plant Resources Department which give basic data and information on local watersheds and environmental situations. Applied and action researches on various topics related to community-based watershed management has been published with the support of the Thailand Research Fund (TRF) by academic institutions such as universities (Chiang Mai, Khon Kaen, Prince Songkhlanakarin, Ratchapatra etc), the Thailand Development Research Institute (TDRI), and the Thailand Environment Institute (TEI). Selected publications are given in the list of publication at the end of the paper.

Local groups are communities in which WSM is practiced. Their tacit knowledge is rarely found in publications. Basic information and local knowledge are documented in a narrative format only in areas where NGOs or researchers have worked or been involved. Nevertheless, there are communities having long-term engagement with partners such as government units, NGOs, and foreign cooperation projects. They have accumulated knowledge and experiences in WSM that can be learnt and shared with others. Selected communities are:

The Rehabilitation of The Nan River (case 2): The Nan River is a tributary of the Chao Phraya River. The watershed of the river was seriously deteriorated and its aquatic animal resources were becoming extinct. Various groups of local people led by a revered monk established Hug Muang Nan Network to mobilize local people's

participation to restore the watershed. The Network is an outstanding case in the North for watershed and natural resources rehabilitation by the people using their local knowledge and wisdom. (1LY)

The Rehabilitation of Songkhla Lake (case 3): The Lake covers a part of Songkhla, Patthalung and Nakon Si Thammarat Provinces. Its polluted condition seriously affected the fishermen's way of life. To ease the problem, both farmers and small-scale fishermen established a conservation network and have been working together intensively to raise people's awareness for conservation of the lake. The Lake's condition has gradually been improved and the fishermen have been able to resume their occupation. More than 200 research projects have been conducted over the last two decades, and they are certainly worthy of study. (1LY)

Conflict Management on NRM of The Upper Ping River (case 4): The upper Ping River basin in Amphoe Chiang Dao of Chiang Mai Province is inhabited by various groups of people, non-Tai tribal groups upstream and Tai Muang people downstream. The tribal people have been using their wisdom to manage the land on the hills in an agroforestry system and the Tai Muang has continued using their traditional irrigation system in the downstream region. This is an example of how people of different ethnic groups can co-operate in managing resources in a watershed in a sustainable way. (1LU)

Participatory Watershed and Forest Management of The Mae Wang River (case 5): The Mae Wang Watershed Network was established by the local villagers in Amphoe Mae Wang of Chiang Mai. The linkage of good management of the forests in the upstream watershed area and the traditional irrigation system in the downstream has lessened local water distribution conflict. (2MY)

Policy and Law

It is clear, as has been stated in various workshops/seminars, that there is no clear and unified national-level policy on water and watershed management; all that there is cabinet decisions on watershed classification that defined watershed classes, land use, soil and water conservation measures as well as ad hoc policies of the top administrators.

Practically, watershed management involves management of various areas including land, forest, biodiversity, water, human activities, settlement and development, as well as the environment. Therefore, many organizations and laws are involved i.e., land law, forest-related laws, water-related law, environmental law. Problems have arisen for many years because of the abuse of the customary laws of indigenous groups and local communities and unfair law enforcement, and these problems have caused serious conflict between communities and the government.

The People's Network has been urging Parliament to pass the draft community forest bill for almost nine years, as yet unsuccessfully. The experience gained and lesson learnt in the parliamentary processes of CF bill is interesting. It reflects the different ideologies of various groups in managing forests, and in protecting certain areas in particular. The government recognizes conflicts among laws themselves and conflicts between government and customary laws. Under the poverty alleviation program, laws

to protect and enhance community rights are receiving serious consideration and are being developed.

In the administration and management, there have been efforts to develop a water act since 1993 and these still continue. Important issues such as water rights and a national administrative unit to manage water are being focused upon and are being studied by the Ministry of Natural Resources and the Environment (cases 6-10). Selected experiences and lessons learnt at various levels include:

Privatization of Water Works (case 11): The Pathumthani Water Works Company in Pathumthani Province is located in the Chao Phraya River area. A study revealed that the amount of water consumed by people in Pathumthani Province will increase from 122,372 cubic meters per day in the year 2001 to 216,888 cubic meters per day in 2011. The government cannot meet the prospective need because of its capacity is insufficient. Thus, the water supply was made a private enterprise to cope with need for increased production. The project was supported by JICA of Japan. Water in the Chao Phraya River is used for this purpose. Privatization of the water supply business has led to an increase in the price of water and to serious conflict over water allocation. This case is worth studying to learn about problems and conflicts and their resolution in the privatization of a water supply system. (1LU)

Organic Agricultural Network Development of Surin Province (case 12): This is a provincial level network. It was established to ease the problems of high debt among local farmers because of high production cost and of poor health due to their use of agricultural chemicals. The farmers turned to organic farming and improved the quality of their product so that they have been able to export their rice and earn more income. Organic agriculture has been made a policy of Surin Province. (1LU)

Management of Conflicts Over Natural Resources of Mae Chaem (case 13): The Mae Chaem watershed of Amphoe Mae Chaem, Chiang Mai—a tributary of Chao Phraya River—is located on high land. This area is inhabited by people of various tribes. The conflicts over the use of land, forests as well as water were very common. However, the people have organized a network to deal with the problems by raising people's awareness and resolving conflicts over resource use peacefully. The resource management conflict resolution cases are worthy of study. (2MY)

Management of Water Use Conflict Among Upstream, Midstream, And Downstream Communities of Mae Ta Chang (case 14): The villagers living in Mae Ta Chang watershed, Amphoe Hangdong, Chiang Mai Province faced conflicts over water distribution. The conflicts were between those living in the upstream, midstream and downstream regions. To ease the problems, the villagers held public discussions to find solutions, conducted research, and developed water distribution regulations that were mutually agreed upon. The peaceful mechanism for water use conflict management is worthy of study. (2SY)

Organization/Institutions

Watershed management was previously the responsibility of a small unit of the Royal Forestry Department, currently the Department of National Parks and Plant Resources. At present, more than 40 organizations are involved in the management of watershed

areas. Major organizations are the Royal Irrigation Department of the Ministry of Agriculture and Cooperatives, which is responsible for storage and supply functions, the Department of National Parks and Plant Resources, which is responsible for forest management functions, and the Department of Water Resources of the Ministry of Technology and Energy, which is responsible for information administration.

It can be said that watershed management at the national level has yet to be instituted due mainly to unclear policies for the public. The government system reform is ongoing with the aim that administration and management of water resources will be properly established; however, other aspects of watershed management policies related to land and forest remain unclear. Nevertheless, some good experience has been gained and practices have evolved that are worth being shared, particularly working processes of the National Policy on Water Resource Committee, the National Forest Committee, the Environmental Fund, and the National Network on the Environmental etc (cases 15-18). Selected experience and lessons learnt at local level include:

Community Rice Mill of Kud Chum (case 19): Most of the villagers of Tambon Kudchum in the Chi River basin, Yasothorn province are rice farmers. They were in debt because of investment for farming, and they were in poor health because of their use of agricultural chemicals. They solved their problems by organizing, pursuing organic farming, and founding their own community rice mill. As a result they are able to sell their rice at higher prices. Their organic rice farms and community rice mill are worth visiting and study. (1LU)

Chemical-Free Rice Production of Nakhon Sawan (case 20): This is a network of Nakhon Sawan farmers who use no chemicals in producing rice for export. It is a provincial level network promoting and developing technologies to reduce the rice production costs. With the support of the Nakhon Sawan community, the network has successfully developed varieties of rice and improved fields, soil, pest control and markets for chemical-free rice. The whole processes of rice farming development is worthy of study. (1LU)

Stone Dike Construction of Nong Doo Community (case 21): The villagers of Ban Nong Doo, Amphoe Waeng Noi, Khon Kaen province in the Chi basin, who had been suffering from drought in summer, joined together in raising funds and mobilizing the people's participation in the construction of a stone dam in the Chi River to store water for dry season use. This is a good example local people of mobilizing to manage the problem of drought on their own. (1LU)

Biodiversity Conservation Through Herbal Medicinal Plant of Yasotorn (case 22): The villagers of Ban Lad in the Chi Basin founded a Herbal Group to produce herbal medicine for sale. This helps to preserve local knowledge about herbal medicine and biodiversity in community forests, house compounds and farm lands. This is a good case study of management of biodiversity by a community. (1LU)

Forest Management for Food Security of Dong Keng, Roi Et (case 23): The villagers of Amphoe Panom Prai in Roi Et Province in the Chi River Basin restored degraded forest so that it became a source of mushrooms and other wild foods and of income for villagers. (1LU)

Forest Conservation for Food and Income By Women's Group (case 24): The female members of the Tung Yao village, Lamphun Province, formed a group to conserve their forests. At present, they are able to harvest abundant forest produce and process it for sale, so they are able to earn more money for their families and community. The management of the forest and the processing of forest product by the women's group is interesting to study. (1LY)

Community Forest Management for Water of Ban Lang (case 25): Tambon Ban Lang of Rayong Province, on the eastern coast of the Gulf of Thailand, used to suffer from water shortages because of deforestation. The people did not have sufficient water for their fruit orchards. To ease the problem, they mobilize people to protect head water forest and as a result, the streams are now full of water. This case is of interest in learning about forest management for to assure water supply for fruit orchards. (2SU)

Natural Resources Management by The Inpaeng Youth Network (case 26): The villagers of Kud Bak, Sakon Nakhon Province, who used to suffer because of inadequate incomes caused by deteriorating natural resources, got together to revive and conserve local wisdom and natural resources. They have passed on their knowledge and experiences to the younger generation. The youth group has become a network and continues managing resources, and the community has become an economically viable society. This is an interesting case in which a youth group and its network manage natural resources. (2MU)

Wetland Management of Kud Ka Keem (case 27): Ten villages in Kud Ka Keem of Surin Province demarcated conservation areas, built small dikes, and established rules and regulations for water distribution and activities concerning the revival and conservation of wetland. This is an interesting case of organization of local people to manage wet lands. (2SY)

Local River Basin Administration, Prachinburi (case 28): The Prachin Watershed Sub-committee is unlike the other 24 watershed management committees in that it is the only one that is chaired by a villager, not by a governor. Thus, management is conducted by the villagers' representatives, and it is worth studying to learn how the mechanisms involved work. (1LU)

Planning

Watershed planning covering the whole watershed system is rather new in Thailand. In the past, watershed planning was top-down and limited in scope to specific issues such as forest management, water management, or community development, depending on the mandate and objectives of the government agencies responsible. Interesting research conducted in the 1990s in the Mae Tang watershed in the North revealed that over 20 government agencies were engaged in watershed planning and management without cooperation, resulting in inefficiency in solving problems in the watershed. Watershed resources were rapidly degraded while government budget and the number of officials involved increased. This led to the idea to integrate the efforts of government agencies in watershed planning. A pilot watershed was selected in each region and experiments were carried out. Furthermore, various experimental projects such as the Sam Muen Highland Development Project, the Nan Integrated Watershed Development Project, the Mae Chaem Watershed Development Project, the Phu Wiang

Integrated Watershed Development Project, the Development of Diversified Forest Rehabilitation Project at Phu Luang, were undertaken with international cooperation.

The experience gained and lessons learnt from these projects were that the watershed approach required strong participation of local people and organizations, and small-scale participatory watershed planning and management was recommended. However, national policy retains its focus on 25 major watersheds. Later, 25 watershed master plans were developed with the emphasis on water storage and supply mainly by means of engineering works. They were strongly criticized for the top-down planning approach and met with resistance and little cooperation from local people. Mega projects on water resource management are highlighted as a top priority policy and plan of the government and will be put into the National Economic and Social Development Plan 2006-2010 (cases 29-31).

However, people have learned a lot from various projects as well as the impact of top-down government policies. Watershed approaches that integrate all kinds of natural resources and local people have been realized. Participatory methods in planning and management of natural resources in small watersheds have been widely used and various watershed networks have been formed. Selected experiences and lessons learnt for sharing are:

Participatory Land Use Planning in Loei (case 32): The villagers in the basin of the San River, a tributary of the Mekong in Loei Province, and government agencies joined in setting up a model for development of participatory land use. The mechanism for participatory watershed land use planning is worthy of study. (2SY)

Integrated Agriculture, Community Forest and Development Activities in Nan (case 33): Tambol Nam Kian of Pupiang district, Nan province outstanding and strong community organization that developed integrated agriculture, protected forests, developed community funds, community bank, and become self-sufficiency community. (2SY)

Development of Alternatives to Forest Inhabitants of Pato (case 34): The villages of Amphoe Pato in Chumpon Province, a region in the Langsuan Basin, joined in rehabilitating the ecological system of the forest watershed through various agroforestry systems and developing a community savings network. This became a model of people and forests supporting each other. The agroforestry systems and saving groups are worthy of study. (2SU)

Rehabilitation of Wet Land Resources of The Song Khram River Basin (case 35): The lower Song Khram basin, a large wet land in Nong Khai which is part of the Mekong basin, was deteriorating. The villagers in the region, who depended on it for their livelihood, have joined together in rehabilitating the wetland. They have been able to revive the natural resources and earn more income. Integrated wetland planning was conducted and implemented. This case is worth studying to learn about the organization of a network to rehabilitate wetland resources and wetland integrated planning. (2MY)

Restoration of The Watershed Ecological System at Khao Paeng Ma (case 36): The villagers of Khao Paeng Ma in Amphoe Pak Chong of Nakhon Ratchasima Province, in the headwaters of the Mun basin, together with the Local Administration Authority and

a non-government organization, revived forests and ecosystems. As a result, streams began flowing and large wildlife species, such as wild oxen, returned to the forests. The area has become a tourist attraction and an educational resource for the community. This case is a good example of ecosystem restoration by a community and local groups. (2SU)

Participatory Land Use Planning of Nam Choen (case 37): The villagers of the Nam Choen community in Chaiyaphum province at the source of the Chi River and government agencies together developed participatory watershed land use planning. The development of a mechanism for participatory watershed planning is interesting. (2LY)

Implementation

Interesting cases at the national level are the Eastern Region Watershed (case 38) and the water diversion from the Mae Klong to the Chao Phraya River (case 39). The Eastern Region Watershed involves administration and management of water resources for three major sectors: urban, agriculture and industry, while the diversion of the Mae Klong River to the Chao Phraya River is a large-scale project affecting a great number of people in both river basins.

Even though not properly documented, many small-scale watershed management cases at the local level are quite interesting and can be found in all regions of the country. They are characterized by being small in scale, involving community participation and integration (case 40), and having a specific focus, e.g., water or forest. Selected experiences and lessons learnt for sharing are:

Assisted Natural Regeneration of Dong Yai Forest, Amjajcharoen (case 41): Dong Yai communities of Amnajaroen province formulated network to restore its degraded forest resource with strong cooperation with Tambon Administration Organization and become a rich forest with full of food and source of income for communities surrounding. (1LY)

Integrated Rehabilitation of Nong Leng Sai Wetland by Community, Payao (case 42): Community networks restored their forest watershed and swamp for agriculture, fishery, community water works, and was promulgated as a regional-level Ramsar site. (2SU)

Building Capacities of Community Through Community Groups (case 43). In strengthening community capacities to solve problems, Ban Sam Kar, Tambol Hua Sua, Amphoe MaeTa of Lumpang province develops groups saving group, agriculture group, farmer group to support agriculture and agricultural business to solving household's debt problem and strengthening community organization. (2SU)

Integration of Natural Resource Management, Integrated Agriculture and Community Development, Ubon Ratchatani (case 44): Ban Chat, Amphoe Kong Chiam, Ubon Ratchatani Province has a strong organization that cooperates with government agencies in management of natural resources, integrated agriculture and community development. Of interest are the development of cooperation and the organization of local people to manage natural resources. (2SU)

People Irrigation System (case 45): Ban Nong Kae – Suan Sawan, Tambol Nong Kae, Amphur Rasrisarai, Srisaket Province built an irrigation system for paddy fields through the active participation of farmers. This is an interesting example of the building of a local irrigation system. (1LU)

Conflict Resolution on Water Gauge Dividing Fresh and Sea Water (case 46). Community of Tambol Prag Nam Dang, Amphoe Amphawa, Samut Songkram province built learning processes through participatory action research to peacefully resolve conflict between fresh water farmers and sea water farmer. (2SY)

Rehabilitating Swamp Forests for Water, Agriculture and Material for Household Manufacturing (case 47): The Kan Thu Le community, Amphoe Tachana, Suratthani Province formed a community organization and rehabilitated swamp forests for water, agriculture as well as raw material for mat weaving. It is interesting for study in terms of organizing local people to rehabilitate swamp forests and small-scale enterprise development. (2SU)

Community Network Managing Protected Areas in Dong Na Tam Forest (case 48): Communities in Dong Na Tam forest, Amphoe Kong Chiam, Ubon Ratchatani Province, formed a network to manage community forest and effectively protect the forests in protected areas. (1LU)

Forest Fire Management by A Community (case 49): Communities in the Mae Khan watershed, Amphoe Mae Wang, Chiang Mai Province, formed a network of local communities to manage forest fires and an irrigation system. (2MU)

Managing Conflicts Over Water Use Among Upstream, Mid-Stream and Downstream Communities (case 50): Communities in the Mae Ta Chang watershed, Amphoe Hang Dong, Chiang Mai Province, developed a watershed network, water use regulations and communication processes to resolve conflict among upstream, mid-stream and downstream communities. (2SY)

Monitoring and Evaluation

In the past, watershed management has been monitored by the government agencies on an issue-by-issue basis, such as in forest encroachment, wildlife poaching, stream-flow quality testing etc. These approaches have not been widely used due to the technical requirements and expense. However, some participatory approaches such as participatory monitoring and evaluation, participatory assessment of forest resources, Participatory Wildlife Assessment, River investigators of the Green World Foundation (case 51) and the Rak Tha Chin Group, have been developed. Some field-based local experiences and lessons learnt recommended for sharing are:

River Conservation, Thachin (case 52): A network of people (teacher, monk, youth) along Thachin river developed group and monitor water situation of the river. (2SY)

River Investigators Project (case 53): A youth group of Tambol Klong Noi, Amphoe Muang, Suratthani Province, formed the Klong Noi youth group and monitored water quality of over 10 rivers in Tambol Klong Noi. This resulted in better water quality in

their communities. The organization of this youth group to monitor water quality is worth study. (2SU)

Monitoring Water Quality in Streams Receiving Industrial Plant Waste Water (case 54): A network of villagers along the Pong River in Khon Kaen Province formed the Nam Pong Network and monitored water quality from various industrial plants such as pulp and paper plants and sugar plants. This is an interesting example of the mobilization of local people and agencies to monitor water quality. (2LU)

Investigating Forest and Water in The Ping River (case 55): A network of communities in Amphoe Chiang Dao, Chiang Mai Province developed indicators to monitor water quality in the upper Ping River. The indicator development process is interesting. (1LU)

Nature Walk along Mun River (case 56): A network of people and organizations in communities along the Mun River developed a river monitoring system by organizing nature walks along the river every year to check on changes in ecosystems and communities. The organization of a large movement of people to monitor watershed resources is worth study. (1LU)

Contact Information

Selected best practices no.	Contact addresses/persons
1.Faculty of Forestry, Kasetsart University	50 Phahonyothin road, Jatujak, Bangkok 10900
2.The rehabilitation of Nan river	Hug Muang Nan Foundation, 96 Soi Aranyawas, Sumontavarat road, Tambol Niwiang, Amphoe Muang, Nan 55000
3.The rehabilitation of Songkhla lake	Network for Small Scale Fishery, 57/216 Tambol Pawong, Amphoe Muang, Songkhla
4.The conservation of Upper Ping river	Network for Natural Resource Management, Upper Ping Watershed, 418 Moo 7 Tambol Chiang Dao, Amphoe Chiang Dao, Chiang Mai 50170
5.Participatory watershed and forest management, Mae Wang	Ban Tung Luang, Tambol NongTao, Amphoe Mae Wang, Chiang Mai : Mr. Joni Odochao
6.-9. Water related Acts	Department of Water Resource, Ministry of Natural Resource and Environment, 49 Phraram 6, Phayathai, Bangkok 10400
10. Drafted Community Forest Act	Royal Forest Department, 61 Phahonyothin road, Jatujak, Bangkok 10900
11.Privatization of water works	Patumtani Water Works Co., Amphoe Muang, Patumtani.
12.Organic agricultural network development, Surin	Organic rice farmer group, Ban Nong Koo, Moo 2, Tambol Nong Koo, Amphoe Sangkla, Surin
13.Conflict management on natural resource uses, Mae Chaem	CARE International Thailand (Rak Thai Foundation) 5/14 Moo 3 Tambol Chang Keng, Amphoe Mae Chaem, Chiang Mai 50270
14.Conflict management on water uses, Mae Ta Chang	MaeTaChang Watershed Network, 183 Moo 4 Tambol Banpong, Amphoe Hangdong, Chiang Mai 50230
15.-18. Environment related laws	Ministry of Natural Resource and Environment, 60/1 Soi Pibulwatana, Phraram 6, Phayathai, Bangkok 10400
19.Community rice mill, Kudchum	Network for Organic Agriculture, 57 Moo 2, Ban Sokkumpoon, Tambol Naso, Amphoe Kudchum, Yasothorn 35140
20.Chemical rice free production, Nakornsawan	134 Kosee Road, Tambol Paknampo, Amphoe Muang, Nakornsawan 60000: Punpat Chai-ear
21.Stone dike construction, Nong Doo, Chaiyaphum	Nam Chee Conservation Group, Ban Nong Doo, Amphoe Wang Noi, Khon Kaen : Mr.Picharn Tipwong
22.Biodiversity conservation through	Center for Health and Herbal Plant

Selected best practices no.	Contact addresses/persons
herbal medicine plant, Yasothorn	Development, Wat Ta Lad, 75 Moo 3, Ban Ta Lad, Tambol Naso, Amphoe Kudchum, Yasothorn 35140
23.Forest management for food security, Roi-et	Network for Dong Keng Community Forest, 119 Moo 7, Tambol Sansuk, Amphoe Phanomprai, Roi-et
24.Forest management for food and income by women group, Tungyao, Lumpoon	Ban Tung Yao, Tambol Sribuaban, Amphoe Muang, Lumpoon 51000 : Mrs Paki Wanasak
25.Forest management for water, Ban Lang, Rayong	Forest Conservation Group, 160 Moo 6, Tambol Ban Lang, Amphoe Muang, Rayong
26.Revival of local resources and wisdom by Inpaeng youth group, Sakonnakorn	Inpang Group, 149/7 Moo 8 Ban Bua, Tambol Kudbarg, Amphoe Kudbarg, Sakon Nakorn 47180
27.Wetland management of Kudkakeem	Forest Conservation Group, Tambol Kudkakeem, Amphoe Ratanaburi, Surin : Vichit KamNgam
28.Local river basin administration, Prachinburi	Network for Prachinburi citizen, 416 Na Muang Road, Tambol Na Muang, Amphoe Muang, Prachinburi 25000 : Bussabong Chaokunha, Chumnong Suaydee
29.-30. Water/watershed plan	Office of Environmental Plan and Policy, Ministry of Natural Resource and Environment, 60/1 Soi Pibulwatana, Phraram 6, Phayathai, Bangkok 10400
31.Community plan	Community Organizations Development Institute (Public Organization), 2044/28-33, New Petburi road, HuayKwang, Bangkok 10320
32.Participatory land use planning of Nam Sarn, Loei	Natural Resource and Environment Unit, Amphoe Muang, Loei
33.Integrated forest and agricultural development by community, Nam Kian	Ban Nam Kien, Amphoe Pupiang, Nan 55000 : Mr. Sanit Sairokham
34.Development of alternatives to forest inhabitants of Luang Suan watershed, Pato	Man and Forest Project, Moo 9 Ban KlongRua, Tambol Paksong, Amphoe Pato, Chumporn
35.The rehabilitation of wet land, Lower Songkram basin	Songkram Watershed Conservation Group, Ban Dong Sarn, Tambol Pon Ngam, Amphoe Argas Amnuoy, Sakon Nakorn
36.Restoration of ecosystem at Khao Paeng Ma	Coordinating Unit, 38 Moo 15, Ban Pothong Patana, Tambol Wangnamkiew, Amphoe Wangnamkiew, Nakorn Ratchasima : Chookdee Poraloganon
37.Participatory watershed land use planning, Nam Choen	Natural Resource and Environment Unit, Amphoe Muang, Chiyaphum

Selected best practices no.	Contact addresses/persons
38.Eastern region watershed	Thailand Research Fund, 14 SM Tower, Phahonyothin, Samsean Nai, Phayathai, Bangkok 10400, Tel. 022980455-75
39.Mae Klong-Chao Pra Ya water diversion	Department of Water Resource, Ministry of Natural Resource and Environment, 60/1 Soi Pibulwatana, Phraram 6, Phayathai, Bkk 10400
40.Integrated WSM, Hug Muang Nan network	Hug Muang Nan Foundation, 96 Soi Aranyawas, Sumontavarat road, Tambol Niwiang, Amphoe Muang, Nan 55000
41.Assisted natural regeneration by community, Dong Yai	Sand Tho Noi Tambol Administration Organization, Amphoe Huasapan, Amnajchareon 37240
42.Restoration of forest for agriculture and water works of the community, Nong Leng Sai	Alternative Agricultural Group, Ban Sanssalee, Tambol Ban Tom, Amphoe MaeJai, Payao 56000
43.Development of community groups to solve agriculture and household's debt problems, Ban Sam Kar	Saving group, Moo 6, Tambol Huasua, Amphoe MaeTha, Lam Pang: Chamnong Chunjom
44.Sustainable uses of forest products, Ban Chat	No. 17 Moo 3, Tambol Nantang, Amphoe Srimuangmai, Ubon Ratchatani: Mr.Amnouy Wonglakorn
45.People irrigation system, Nongkae-Suansawan	53/1 Sraboran Rd., Tambol Nimuang, Amphoe Muang, Surin 32000 : Mr.Sanan Chusakun
46.Resolve conflict on water gauge between fresh and sea water between community organizations, Prag Nam Daeng	Rak Mae Klong Group, Ban Prag Nam Dang, Tambol Prag Nam Dang, Amphoe Amphawa, Samut Songkram 75110
47.Rehabilitation of swamp for water, agriculture and weaving material, Kan Thu Lee	Ban Kantulee, Moo 2, Tambol Kantulee, Amphoe Tachana, Surattani, 84170
48.Community network managing protected areas, Dong Na Tam	Dong Na Tam Community Forest Network, 4 Moo 8, Ban Poonua, Tambol Napoklang, Amphoe Kongjiam, Ubon Ratchatani 34220
49.Forest fire management, Mae Khan	138 Moo 7, Tambol Nong Tong, Amphoe Hang Dong, Chiang Mai, 50340
50.Conflict management, Mae Ta Chang	MaeTaChang Watershed Network, 183 Moo 4 Tambol Banpong, Amphoe Hangdong, Chiang Mai 50230
51.River investigator project	Green World Foundation 394/46-48, Soi Penpak, Makaratch Rd., Phanakorn, Bangkok 10200
52.River conservation, Tha chin	Tambon Bangratuk, Sampran District, Nakornpratom, Densiri Tongnoppakun, Network secretary
53.River investigators, Klong Noi Youth	Youth Initiative group, 57/7 Moo5,

Selected best practices no.	Contact addresses/persons
group	Tambol Bangkung, Amphoe Muang, Surattani, : Mr.Chuntarat Rupan
54.Monitoring of Pong river by community network	Project for Nam Pong Conservation and Recovery, 686/5 Soi Wuttaram, Namuang Rd., Amphoe Muang, Khon Kaen, 40000
55.River investigators, Upper Ping river	Green World Foundation 394/46-48, Soi Penpak, Makaratch Rd., Phanakorn, Bangkok 10200
56.Nature walk to monitor Mun river	53/1 Sraboran Rd., Tambol Nimuang, Amphoe Muang, Surin 32000 : Mr.Sanan Chusakun

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- Niyom, W., Chunkao, K., and T, Boonchooduang. 1983. Impacts of various mountainous land use patterns on physical properties of water at Doi Pui, Chiang Mai, Research Bulletin, No.38.
- Rerkasem, B and Rerksaem, K. 1997. Shifting cultivation in Thailand. IIED, London.
- Ruangpanit, N. 1970. Relation between rainfall and runoff characteristic. Kog-Ma Watershed, Doi Pui, Chiang Mai. Research Bulletin No. 6
- Sathienrathai, S. 1994. Natural Resource Rights and Conservation Practices in Highland of the Northern Thailand. *Journal of Ecology*. p 5-17. (in Thai with English abstract)
- Tangtham, N. and Aimphan D. 1988. Highland watershed management : from Kog-Ma, Mae Sa to the development of mountain land. Faculty of Forestry, K.U.
- Tribal Research Institute. 1988. Land Use Project: A case study of Lahu Cultivator. Department of Public Welfare, Ministry of Interior. 38 p.
- Tongpan, S. et al. 1990. Deforestation and poverty : Can commercial and social forestry break the vicious circle? The 1990 TDRI Year-End Conference, Research report no. 2

Annex I Related Workshop/Meeting participated

- Feb 1 Met with Dr.Christoph Feldkoetter and Miss Samruay Laejabok, MRC/GTZ technical advisor in Bangkok.
- Feb 6 Workshop for members of the Moon river basin research network
- Feb 7 Conference on Local Research for the Northeastern region, Ubon Ratchatani University- commented research findings related to WSM in the Northeast.
- Feb 10 Seminar/Workshop on National Social and Economic Development Plan (Natural Resource Management section) at Ayutthaya
- Feb 17 Discussed best practice in Prachinburi
- Feb 21 Seminar on Water resource management with over 200 participants- Chaired the session on Natural Disaster and prevention.
- Mar 7 Attended community-based research at Songkhla province
- Mar 28 Discussed with Dr. Cornelis van tuyii and Miss Samruay Laejabok at GTZ office in Bangkok
- Mar 31 Attended local research conference, commented 5 research paper on Community-based NRM
- Apr 19 Discussed with Khun, Suchart Katima, MRC/GTZ consultant on training design
- May 11-13 Organized training to community organization network in Songkhla river basin
- June 8 Participated the focused group discussion on the 10th National Social and Economic Development Plan, Bangkok

Annex II People Met

Officers/Academics

Pakawan Chufamane, Department of Water Resource, Environmental Quality Promotion building, , 49 Phraram 6, Soi 30, Phayathai, Bangkok 10400

Mingsarn Kaossa-art, Social Research Institute, Chiang Mai University, Huay Kaew road, Tambol Suthep, Amphoe Muang, Chiang Mai 50200

Kanit Meesomorn, Office of Forest Conservation, Amphoe Muang, Nakornsawan

Nipon Tangtham, Faculty of Forestry, Kasetsart University, 50 Phahonyothin, Jatujak, Bangkok 10900

Uthai Tongmee, Watershed Conservation Division, Department of National Park and Plant Resource, 61 Phahonyothin, Jatujak, Bangkok 10900

Kanokwan Manolom, Faculty of Leberal Art, Ubon Ratchatani Univ., 85 Warindejudom road, Ubon Ratchatani 34190

Pojjana Ernnpaiboon, Office of National Economics and Social Development, 962 Krung Kasem Rd, Pomprab, Bangkok 10100

and other officers/academics in WSM related meetings/workshops

NGOs

Chaipan Prapasawat, Institute of Community Rights, 3 Waolai road, Tambol Haiya, Muang, Chiang Mai 50100

Hannarong Yaowalert, Wildlife Foundation Thailand, 251/88-90 Phahonyothin road, Anusawaree, Bangkok, Bangkok 10220

Veerawat Teeraprasart, Foundation for Ecological Recovery, 409 Soi Rohitsuk, Pracharatchbumpen road, Huay Kwang, Bangkok 10320

Surapol Duangkae, Secretariat, Wildlife Foundation Thailand, 251/88-90
Phahonyothin road, Anusawaree, Bangkok, Bangkok 10220
Teerawaj Namdung, Eastern watershed conservation group, 139/4 Tambol
Nakornnayok, Muang, Nakornnayok.
Sanan Chusakul, Coordinator, research on Mun Watershed, 53/1 Sraboran Rd.,
Tambol Nimuang, Amphoe Muang, Surin 32000
Nikom Putta, Coordinator of Upper Ping Watershed, Network for Natural Resource
Management, Upper Ping Watershed, 418 Moo 7, Tambol Chiang Dao, Amphoe
Chiang Dao, Chiang Mai 50170
Montree Chuntawong, Foundation for Ecological Recovery, Chiang Mai, 409 Soi
Rohitsuk, Pracharatchumpen road, Huay Kwang, Bangkok 10320
LaoThai Nilnuon, Member of Thailand WSM Task Force, 26/1 Moo 2, Ban Lublao,
Tambol Lublao, Amphoe Phuphan, Sakon Nakorn
Arkkanit Pongpai, Network for Nam Pong Conservation, 686/5 Soi Wutaram,
Namuang road, Muang, Khon Kaen 40000

Communities

More than 30 community leaders involving in water resource management in the North, the Northeast, the East, and the South during the workshops/meetings.

Annex III Publications recommended for further study

Selected publications involved in WSM are divided into different categories as follows:

Local wisdom, Indigenous knowledge, Traditional practice

1. Pra-thammapidok. 1994. Thai People and Forest. The Sub-Committee of Research and Development in Forest Resource and Multipurpose Trees, National Research Council, 126 p. (in Thai)
2. Anek Nakabutr. 1993. Local wisdom on Human and Natural Resources Management: Lessons Learned from Thailand. Local Development Institute, 171 p. (in Thai with an English abstract)
3. Tribal Research Institute. 1988. Land Use Project: A case study of Lahu Cultivator. Department of Public Welfare, Ministry of Interior. 38 p. (in Thai with an English abstract)
4. Pornchai Preechapanya. 1993. Indigenous Ecological Knowledge about the sustainability of Tea Garden in The Hill Evergreen Forest of Northern Thailand. Thai Journal of Forestry 12: 18-26 (1993). (in Thai with an English abstract)
5. Kulwadee Bunpinun. 1993. Karen's Way of Life-A Way Which Blend with the Nature: A Case of Saneh Pong and Kong Mong Tha Villages, Sangklaburi District, Kanchanaburi Province. Journal of Ecology, 43-53. (in Thai)
6. Kanok Rerkasem, Benjavan Rerkasem, Mingsarn Kaosa-ard, Chaiwat Roongruangsee, Sitanon Jesdapipat, Benchaphun Shinawatra, and Pornpen Wijukprasert. 1994. Assessment of Sustainable Highland Agricultural Systems. TDRI. (in English)
7. Manu Seetisarn. 1995. Shifting Agriculture in Northern Thailand: Present practices and problems. In Proceedings of Seminar on the Montane Mainland Southeast Asia in Transition. (in English)
8. Peter Hinton. 1975. Karen Subsistence: The Limits of a Swidden Economy in North Thailand. Ph.D. Thesis, University of Sydney. 303 p. (in English)
9. Pongsak Angkasit. 1988. Highland Agricultural Development. Dept. of Agricultural Extension, Faculty of Agriculture, Chiang Mai University. 132 p. (in Thai)
10. Kwanchewan Buadeng and Manfred van Eckert. 1992. Farmer Centered Sustainable Farming Systems Development in the Highlands of Northern Thailand. Paper presented at the second Farming Systems Research Symposium in Colombo, Sri Lanka, 16 p. (in English)
11. Phrek Gypmantisiri and Suporn Amaruekachoke. 1993. Problem and Prospects of Using Agroforestry Systems for Rehabilitation of Watershed in the North: A case study of Mai Lor Watershed, Chiang Mai Province. Thai Journal of Forestry 12: 45-56 (1993). (in Thai with English abstract)
12. Anan Polthane. 1995. Farmer as Scientist: Farmer Practices and Knowledge in Northeast Thailand: Some Examples. Farming Systems Project, Faculty of Agriculture, Khon Kaen University, 69 p. (in English)

Resource utilization, planning and management

13. Mongkon Vannaprasert and Udhai Thongmee. 1993. Soil and Water Losses on Plots with Different Land Use in the Phu Wiang Watershed. Thai Journal of Forestry 12: 107-117 (1993). (in Thai with English abstract)
14. Nipon Tangtham. 1991. Environmental Impact of Natural Forest Management in Thailand: Journal of Forestry, FF/KU. (in Thai with English abstract)

15. Pennapa Kietkao. 1996. A Study on Land Cover and Land Use Change of Nam Pong Basin, Khon Kaen. M.Sc. Thesis, Kasetsart University. (in Thai with English abstract)
16. Apinun Korporn. 1995. Efficiency of Various Soil and Water Conservation Practices on Hillslope at Mae Sa Integrated Watershed and Forest Land Use Project, Chiang Mai Province. M.Sc. Thesis, Kasetsart University. 67 p. (in Thai with English abstract)
17. Pisit Sukreeyapongse and Sansanee Choowaew. 1996. Resource Use Management at Sam Roi Yod Marsh. Mahidol Magazine 3 (3) 1996 (in Thai with English abstract)
18. The Project for Community Loving Forest. 1993. Historical Chronology of Community Loving Forest : Lesson Learned from Fighting-Protecting Forest of Villagers in the Northern Thailand. Northern NGOs Association. 183 p. (in Thai)
19. Suthawal Sathienrathai. 1994. Natural Resource Rights and Conservation Practices in Highland of the Northern Thailand. Journal of Ecology. p 5-17. (in Thai with English abstract)
20. Patumma Polpakdee. 1992. Gender Roles in Natural Resource Management: A Case Study on Voluntary Check-Dam Construction. M.Sc. Thesis, Khon Kaen University. 127 pp. (in Thai with English abstract)
21. Pichitra Trivongyoi. 1995. Participation of Local People in Community Forest Management : A Case Study of Ban Palun, Tambol Pong Noi, Mae Chan District, Chiang Rai Province. M.Sc. Thesis, Mahidol University. 120 p. (in Thai with English abstract)
22. Tongchun Homnetra. 1988. Effects of People Participation on the Research. Social Forestry News. Khon Kaen University. 1:4 (1988). p 1-12. (in Thai with English abstract)
23. Supachart Sukharomana and Krongtip Sae-Ow. 1988. An Experience in Ex Post Evaluation of Village Woodlot Project in the Poverty Areas of Thailand. Thai Journal of Forestry. 7 : 113-123 (1988). (in Thai with English abstract)
24. Patma Vityakon, Anan Polthanee, Wilaiwatt Grisanaputi and Nitaya Kantisophon. 1993. Factors Influencing Number of Trees on Farms and Farmer's Criteria for Tree Integration into Farming System : A Case Study of District of Kranuan, Khon Kaen. Thai Journal of Forestry 12: 63-76 (1993). (in Thai with English abstract)
25. Research and Development Institute. 1993. The Management of Natural Resource. In Proceeding of seminar on the Management of Natural Resource by community organization in the Northeast. 1993. Published by Community. Research and Development Institute, Khon Kaen University, 71 p. (in Thai)
26. Chalardchai Ramitanond. 1985. Social Forestry for Rural Development. Society of Social Science of Thailand, 243 p. (in Thai)
27. Nipon Tangtam. 1987. Watershed for Rural Community: alternative to watershed management in Thailand. Nipon Tangtam. (in Thai with English abstract)
28. Uraivan Tan-kim-yong. 1993. Participatory Land Use Planning as a Sociological Methodology for Natural Resource Management. Resource Management and Development Program, Faculty of Social Sciences, Chiang Mai University, 50 p. (in English)
29. Manas Techasathien. 1995. Status and Problems of Watershed Administration under the Watershed Classification Measures: A Case Study of Mae Tang Watershed. M.Sc. Thesis, Kasetsart University. 133 p. (in Thai with English abstract)

30. Pakorn Puntu. 1991. Participation of Hilltribe in the Development: A Case Study on Huay Nam Khao Village, Petchabun Province. M.Sc. Thesis, Kasetsart University. 97 pp. (in Thai with English abstract)
31. Viyuth Chamratchphan, Yaowalak Apichartwallop, and Dusadee Aryuwat. 1992. Natural Resource Planning at District Level: A Case Study of Phu Wiang District, Khon Kaen Province. Social Forestry Research Project, Faculty of Sociology and Anthropology, Khon Kaen University, 250 p. (in Thai)
32. RECOFTC. 1993. Buffer Zone Management in Thailand. Proceedings of Seminar held October 1993 at RECOFTC, Bangkok, Thailand, 134 p. (in Thai with English summary)
33. RECOFTC. 1994. Community Forestry Development in Thailand. Proceedings of Seminar, KU. 139 p. (in Thai with English summary)
34. Royal Forest Department. 1990. Community Forest in Thailand. Community Forestry Development and Extension Division. 1990. 191 p. (in Thai)
35. Royal Forest Department. 1991. Community Forestry Techniques: Manual for Government Officer No. 1. Community Forestry Extension Division, 32 p. (in Thai)
36. Royal Forest Department. 1992. Community Forestry Techniques: Manual for Government Officer No. 2, Community Forestry Extension Division, 32 p. (in Thai)
37. Northern Community-based Watershed Development Project. Cooperation between upstream and downstream communities. A case of Mae Soi watershed, Lumpang, 11 pp. (in Thai)
38. Khon Kaen University. 1993. Status on water resource of Thailand. Khon Kaen (in Thai)
39. Song Khla Lake Natural Resource and Environment Management Project (EmSong Project). 1999. Environmental Action Plan for Song Khla Lake, Copy no. 1, 2, and 3. (in Thai)
40. Simachaya, W. 2000. Water Quality Management in Thailand. Paper for the workshop on 'Environmentally sound technology on water quality management' UNEP, Mekong River Commission, November 2000 (in English)
41. Simachaya, W. Lesson Learned: Integrated Watershed Water-Quality Management and Public Participation of the Thachin River Basin, Thailand (in English)
42. Thailand Development Research Institute. 1995. The Economics of Watershed Management: A case study of Mae Tang.
43. Hug Muang Nan Foundation. 2004. Hug Muang Nan : A decade of learning. September 2004, 173 pp.

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44. Kasem Chunkao. 1996. Principles of Watershed Management. Department of Conservation, Faculty of Forestry, Kasetsart University, 789 p. (in Thai)
45. Samakkee Bunyawat. 1996. Applied Watershed Management. Department of Conservation, Faculty of Forestry, Kasetsart University. (in Thai)
46. Kasem Chunkao and Pearmsak Makarabhirom. 1979. Kog-Ma Watershed Research Bulletin No. 34 June 1979 Summer Flow of Hill-Evergreen Forest at Doi Pui Chiang Mai (in Thai with English abstract)
47. Kasem Chunkao, Wicha Niyom, Samakkee Boonyawat, and Sittichai Tantanasarit. 1983. Impacts of Mountainous Land Use on Surface Water at Kog-Ma Watershed Research Station, Doi Pui, Chiang Mai. Kog-Ma Watershed Research Bulletin. No. 40, November 1983. (in Thai with English abstract)
48. Prakob Wirojanagud. 1994. Four major tools for Sustainable Water Resource Management. In Thai Development Newsletter No. 25, 1994, 36-38. (in English)

49. Vincent, J. R., Mingsarn Kaosa-ard, Laxmi Worachai, Eric Y. Azumi, Nipon Tangtham, and Arnel B. Rala. 1995. The Economics of Watershed Management: A Case Study of Mae Tang. Natural Resources and Environment Program, The Thailand Development Research Institute. 71 p. (in English)
50. Samakkee Bunyawat. Sittichai Tantanasarit, and Sumrid Yincharoen. 1991. Impact of Area Management of Doi Tung Project on Water Quality and Timing. Thai Journal of Forestry 10 : 81-95 (1991). (in Thai with English abstract)
51. Niwat Ruangpanit. 1971. Crown Cover of Hill-Evergreen Trees as Affected to Soil and Water Losses. Kog-Ma Watershed Research Bulletin No. 7, Faculty of Forestry, Kasetsart University. (in Thai with an English abstract)
52. Sanit Aksornkoae and Samakkee Boonyawat. 1977. Plant Succession in Relation to Sediment in different Areas After Shifting Cultivation at Doi Pui, Chiang Mai. Kog-Ma Watershed Research Bulletin No. 31. July 1977. (in Thai with English abstract)
53. Somchai Onarsa. 1994. Effect of Watershed Rehabilitation on Streamflow Characteristics at Sakaerat Environmental Research Station. M.Sc. Thesis, Kasetsart University. 78 pp. (in Thai with an English abstract)
54. RECOFTC. 1994. Forest Restoration through Natural Regeneration. Proceedings of Seminar held April 11, 1994 at RECOFTC, Bangkok, Thailand, 96 p. (in Thai)
55. Pearmsak Makarabhirom. 1991. Native Bamboo: Situation, Local Management and Agroforestry/Community Forestry Perspectives at Sub-Lanka Forest Village. In Proceedings of the Fourth International Bamboo Workshop. 141-148. (in English)
56. Mingsarn Kaosa-ard. 1995. Valuation of Natural Resources and Environmental Degradation: A First Step to Conflict Resolution. In Proceedings of Seminar on the Montane Mainland Southeast Asia in Transition. (in English)
57. Sumpan Imsamai. 1993. Guidelines for Forest Plantation through Agroforestry by Farmers. Sak Tong Magazine. (in Thai)
58. Pitak Yuwanon. 1997. Effects of forest cover on peak stream flow and dry-season streamflow of Nan river. M.Sc.Thesis. Faculty of Forestry, K.U.
59. Chusak Witayapak. 1995. Village and it Potential in Natural Resource Management : Case study on community watershed management under common rights regime in the North. Faculty of Social Science, Chiang Mai. (in Thai)
60. Chusak Witayapak. 2000. Communities and Water Resource Management in the North. In. Anan Kanchanapan (editor). Dynamics of Community in Managing Natural Resources: Situations in Thailand. p 177-210. (in Thai)

Policy, laws, legislations

61. Kosit Punpiemrath. 1990. Natural Resource and Rural Development. NESDB. 111 p. (in Thai)
62. NESDB. 2005. Mega Project: Water resources. 91 pages.
63. TDRI. 2002. Policy guidelines on water management in Thailand. TDRI's report no.33, December 2002. (in Thai)
64. Mingsarn Kaosa-ard. 2001. Policy guidelines on water management in Thailand. No 1. research paper, supported by Thailand Research Fund, September 2001. 386 pp. (in Thai)
65. Mingsarn Kaosa-ard. 2001. Policy guidelines on water management in Thailand. No 2. research paper, supported by Thailand Research Fund, September 2001. 461 pp. (in Thai)
66. Mingsarn Kaosa-ard and Adis Issarangkul. 1995. Management Problems and Conflicts on Water : Knowledge study. Bangkok. Thailand Development Research Institute. (in Thai)

67. Ministry of Natural Resource and Environment. 2005. Draft Water Act. (in Thai)
 68. Adis Israngkura. 1995. Diverting Water from the Mae Klong Basin: Whose rights and at what price? Thailand Development Research Institute, 45 p.
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