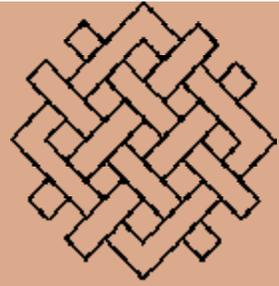


# Resources Policy Brief



WRI

a discussion draft of the resources policy support initiative (REPSI), a project to increase independent analysis of natural resource trends and options for equitable, environmentally sustainable management in montane mainland and southeast Asia. repsi is a project of the world resources institute.

## *ECOSYSTEM MANAGEMENT IN NORTHERN THAILAND*

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*“Protect the forests for water”*

The above slogan has been echoed throughout Thailand in an effort to save its forests. The people of Thailand have been repeatedly warned by the Royal Forest Department (RFD) that the Chao Phraya River, the main river of the basin where the majority of the country's GDP is generated, would become dry if forests in the North are not properly protected (Bangkok Post, August 20, 1999).

The above slogan is also shared by some of the most respectable NGOs. For example, the Hak Muang Nan Foundation adopted a similar slogan, "Protect the forests for water. Protect the rivers for fishes." Under the active support of a locally revered monk, the foundation has been successful in enlisting village members to ordain trees and protect forests, as well as, to establish fish sanctuaries in some sections of the Nan River.

Compared with other Asian countries, Thailand is relatively more abundant in land and less endowed in water (Mingsarn and Benjavan, forthcoming 2000). Therefore, water is highly valued by all segments of the population even though surface water is not priced. Since 1993, many parts of Thailand have been hit by repeated droughts, which culminated in 1997 with the arrival of El Nino. Tying forest protection with water availability has thus, become an advantageous tactic used in public relations for forest conservation. Under the assumption that the more forests there are, the more water there will be, the ecosystem management task of the RFD is simplified to forest protection.

From a holistic perspective, watersheds are very important ecological systems in the maintenance of environmental balance. The impact from activities on any one element of a watershed's ecology will also affect all of the others given the interdependent nature of such a system. Watersheds therefore form a useful base for the management of natural resources. For the purposes of this paper, the management of a watershed ecological system will refer to: the management of natural resources and environment within an area that is physically defined by the topographical division formed by the watershed boundary. Therefore, the process of managing natural resources and the environment includes first of all, an understanding of the valued ecological resources system and the interrelationships among land uses, soils and water, the up-

stream and downstream linkages, as well as, the monitoring and evaluation of environmental services and functions of individual watersheds. Then second, the process of managing natural resources and the environment will include the use of these findings to create development policies that are able to address the observed or potential undesirable outcomes.

The Watershed Management Division, which is now under the Natural Resources and Environmental Protection Office of the RFD, has the specific objective to improve and rehabilitate degraded watersheds and grasslands in the upper catchment areas. Its first priorities are reforestation and fire prevention. In the workshop held in Chiang Mai, one Watershed Unit Chief described that his primary duty was to, "capture as much [degraded forest] land as you can and turn it into forest again." However, while the relatively undisturbed forest areas are under the control of the National Park Division and the Wildlife Conservation Division, the degraded areas are in the hands of the Watershed Management Division. Therefore, in practice, the Watershed Management Division is not actually responsible for all the watershed areas in Thailand, but rather only the watershed areas that are considered 'degraded forest area.' The inevitable outcome of dividing watershed protection duties, depending on the state of the watershed, into three Divisions has been to stall the development of one system of ecosystem management. Unfortunately, while this type of fragmented management might be beneficial in other areas of state management, for ecosystems it often results in directives that are too narrow and fail to recognize the many interrelated aspects related to the sustainability of an ecosystem.

This paper probes into watershed management in Thailand from the policy to the forest and fields, and vice versa, taking watershed protection in Northern forests as a case study. The first section reviews the forest situation in Northern Thailand and the ensuing discussion examines the existing policy and institutional issues. For this purpose, the Mae Taeng and Nan projects, two successful watershed projects in Thailand, have been selected as case studies.

This paper traces why people help the government protect forests and argues that a policy that is designed from the top

down will only be successful if the official objective of the policy coincides with community interests. To prove this hypothesis, a participatory rural appraisal approach was used to detect the community interests and objectives of forest protection for two villages in Thailand. Further, to obtain a better understanding of the role of the Watershed Conservation Unit, a workshop was held in Chiang Mai with the Watershed Management Unit Chiefs of Mae Chaem, Thung Joh, and Upper Nan, as well as, the Forest Environment Research Division of the RFD.

## 1. THAILAND'S FORESTS

Although the concept of ecosystem management encompasses many, various functions and services of the watershed, such as, biodiversity habitat, water quantity and quality, microclimate regulation, and carbon sequestration, there is a tendency for the success of watershed management to be measured solely based on forest cover. This is because forest cover is an important element of watershed ecosystems and also, unlike most of the other elements, it is more readily measurable on a macro scale (Table 1).

### 1.1 Loss of Forest Cover

Thailand has always been blessed with an abundance of natural resources, and particularly so for Northern Thailand. Only a century ago, forests covered 72 percent of Thailand's territory. This accounted for approximately 230 million *rai* (1 ha = 6.5 *rai*) of land. In 1961, less than 40 years ago, that number was still relatively high at 171 million *rai* or 53 percent of the country. However, most recently (1995), only one quarter or 26 percent (82 million *rai*), of Thailand remained under forest cover (see Table 1). From 1961 to 1995, Thailand lost an average of 2.6 million *rai* of forest every year.

Northern Thailand possesses a large share of Thailand's forest resources. It has the highest percentage of land covered by forest area and the largest amount of forest cover in absolute terms. The Northern region has experienced sharp declines in forest cover over the last ten years. In 1961, 69 percent of Northern Thailand was covered by forest, for some 73 million *rai* of forest cover and

**Table 1. Forest Area in Thailand by Region, 1961-1995**  
(unit: *rai*)

Year	Region					
	North	Northeast	Central and West	South	East	Total
1961	72,671,875 (68.54)	44,315,000 (41.99)	22,287,812 (52.91)	18,516,250 (41.89)	13,226,875 (57.98)	171,017,812 (53.33)
1973	70,996,875 (66.96)	31,669,375 (30.01)	14,981,250 (35.56)	11,521,875 (26.07)	9,397,500 (41.19)	138,566,875 (43.21)
1976	63,954,375 (60.32)	25,933,750 (24.57)	13,641,250 (32.38)	12,586,875 (28.86)	7,894,375 (34.60)	124,010,625 (38.67)
1978	59,335,625 (55.96)	19,513,125 (18.49)	12,766,250 (30.31)	11,011,875 (24.89)	6,898,125 (30.24)	109,525,000 (34.15)
1982	54,847,500 (51.73)	16,178,750 (15.33)	11,572,500 (27.47)	10,276,250 (23.25)	5,000,000 (21.92)	97,875,000 (30.52)
1985	52,578,750 (49.59)	15,987,500 (15.15)	11,053,125 (26.24)	9,678,125 (21.90)	4,993,750 (21.89)	94,291,250 (29.40)
1988	50,251,250 (47.39)	14,808,125 (14.03)	10,777,500 (25.59)	9,143,750 (20.69)	4,896,250 (21.46)	89,876,875 (28.03)
1989	50,138,750 (47.29)	14,741,250 (13.97)	10,764,375 (25.55)	9,125,000 (20.65)	4,866,625 (21.33)	89,635,625 (27.95)
1991	48,214,375 (45.47)	13,624,375 (12.91)	10,385,000 (24.65)	8,405,625 (19.02)	4,806,875 (21.07)	85,436,250 (26.64)
1993	47,019,375 (44.35)	13,420,625 (12.72)	10,234,375 (24.30)	8,005,000 (18.11)	4,771,250 (20.91)	83,450,625 (26.02)
1995	46,178,701 (43.55)	13,290,417 (12.59)	10,180,105 (24.17)	7,784,105 (17.61)	4,744,797 (20.80)	82,178,161 (25.62)
Total Area	106,027,680	105,533,958	42,124,189	44,196,992	22,814,063	320,696,882

Note: Figures in parentheses are percentage of forest cover of region's total area

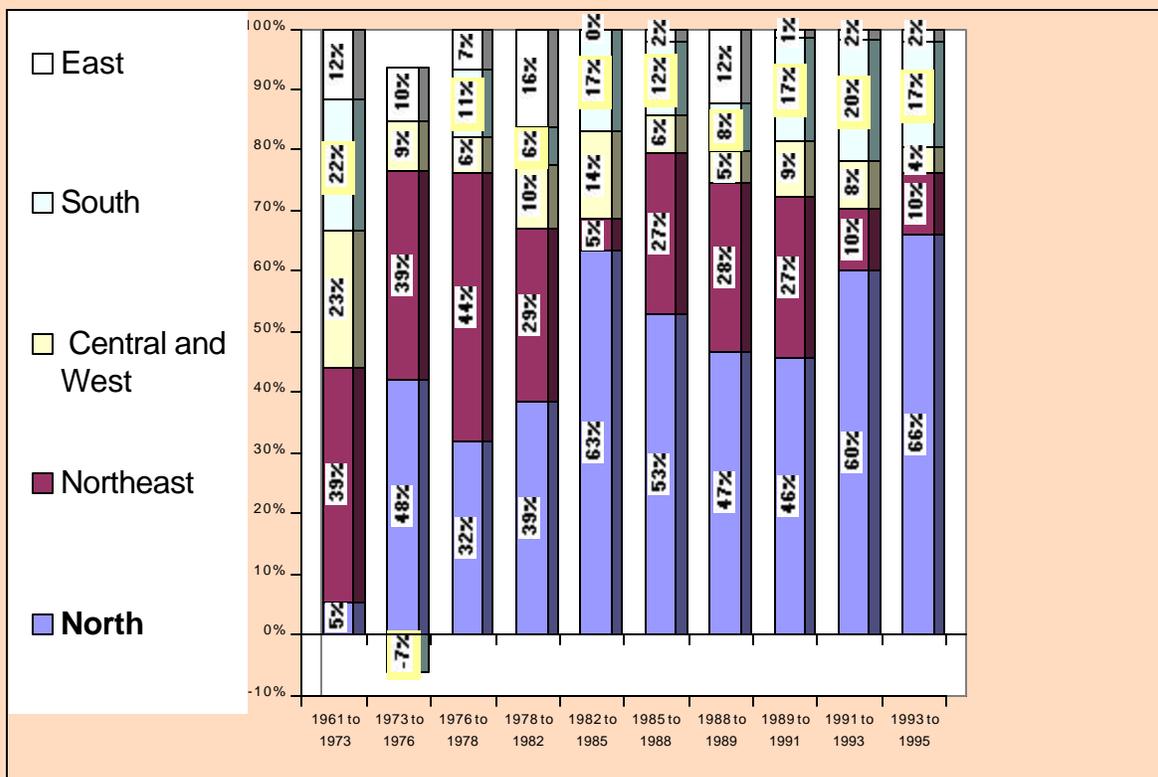
Source: Royal Forest Department, 1997

by 1995, these figures had dropped to 44 percent and 46 million *rai*, respectively (Table 1). However, given that the North accounts for the major share of the total forest cover in Thailand, it often sustains the greatest proportion of the total forest losses per period (Figure 1). Between 1982 and 1985, over 60 percent of the total forest area loss in Thailand occurred in the North (Figure 1). Notably, the north also has maintained a near majority of the losses since that time.

For both the Northern region and Thailand as a whole, the worst losses came during the 1976 to 1978 period when the forest cover in Northern Thailand declined at an average annual rate of 3.61 percent, and 5.84 percent for the whole of Thailand (Table 2). However, from that time the average annual rates of forest cover loss have generally demonstrated an improving trend, for both the North region and Thailand as a whole.

In part, while the recent and slightly improving trend in forest loss might be attributable to the cessation of logging policies, these policies have not had nearly the positive effects expected. Dating back to the first teak logging concessions granted to private enterprises in 1864, the Northern region has a long history of commercial forestry. Logging activities remained limited in scope for a long time, given that the Northern region was relatively isolated and difficult to access due to its predominantly mountainous terrain. For this reason, the initial forest losses were relatively small in comparison to the rest of the country. Nevertheless, there were several cumulative and reinforcing events, which took place and essentially led the Northern region to lose a substantial amount of its forest cover. First, the removal of mature timber stands allowed the forest dwellers to settle in the uplands. Second, for political and economic reasons, the transportation infrastructure, both within the Northern region and the region connecting it with the

**Figure 1. Proportion of Regional Forest Area Loss as a Percentage of Total Forest Area Loss per Period, 1961 to 1995**



Note: Negative forest loss indicates forest area recapture  
 Source: Derived from data in Table 1

**Table 2. Average Annual Rates of Forest Loss for Thailand and the North Region per Period (%)**

Period	Average Total Rates of Loss	Average Rates of Loss for the North Region	Annual Average Forest Loss Rates before and after Logging Ban
1961 to 1973	1.58	0.19	---
1973 to 1976	3.50	3.31	---
1976 to 1978	5.84	3.61	---
1978 to 1982	2.13	1.51	---
1982 to 1985	1.22	1.38	---
1985 to 1988	1.56	1.48	---
1988 to 1989	0.27	0.22	4.1566
1989 to 1991	2.34	1.92	---
1991 to 1993	1.16	1.24	---
1993 to 1995	0.76	0.89	2.5914

*Source: Derived from data in Table 1*

rest of the country, received considerable attention from 1863 to 1957. This further improved access to forests for logging and made it easier for people to inhabit the cleared land, as well as, acted to encourage the development of other economic activities in the region, such as tourism.

Alarmed by the rapid rate of deforestation, in 1989, the Thai Government revoked all terrestrial forestry concessions by decree. Although Thailand did experience a 37 percent decline in the average annual rate of forest loss subsequent to the ban, the decreed logging ban, unfortunately, did not have the magnitude of reduction in rates as had been previously hoped. The average amount of forest loss in the seven years following the ban was still at an astounding 1.2 million *rai* annually, which is not nearly a significant enough reduction to help Thailand sustain its forests in the future.

## 1.2 Forest Fires

Fire is often used in Thailand to accomplish a number of things. First, fire is often the cheapest technology available for land clearing in upland farming. Secondly, grazers use fires to stimulate young leaves, and third, hunters in pursuit of wild animals at times use fires. In the tropics, fires are often man-made and any uncontrolled or unmanaged fires could lead to large-scale damages to

forests. If a region suffers repeatedly from forest fires, not only will it suffer from the loss of trees, but also from the degradation undergone by soil and water resources. Forest fires also have the ability to affect the global ecosystem if they are large enough, as in Indonesia in 1997, because the smoke from forest fires contains an abundance of carbon dioxide, which is a greenhouse gas. Forest fires also affect wildlife, either by injury, death, or by destroying the wildlife's food sources and habitats.

However, the effects of forest fires are not all necessarily negative. If forest fires take place on a moderate scale, such that when the forest regenerates it does not evolve into a different kind of ecosystem, *and* the forest fires are not repeated very often, then they can actually have some beneficial effects. Forest fires help to eliminate dry forest litters, such as leaves, and thus, prevent major fires by averting the accumulation of litters on the forest floor, which could act as fuels for uncontrolled forest fires. The burning of forests on a very small scale can also improve soil fertility and structure, and improve soil infiltration.

Aerial inspections of areas damaged by forest fires from 1985 to 1994 indicate that in each of those years more than one million *rai* of forest burned down. The first year that forest fire surveys and forest fire fighting operations were vigorously carried out was in 1989. That year it was found that 22 million *rai*, or 24

**Table 3. Forest Fire Damage per year****(unit: *rai*)**

Region	Year				
	1985	1986	1992	1993	1994
North	15,702,839	15,989,197	8,770,665	4,802,642	2,333,993
Northeast	3,708,170	3,648,740	1,405,784	2,406,713	901,023
Central	1,762,681	2,101,427	1,313,607	1,233,052	1,088,795
South	920,752	1,993,694	640,394	680,202	442,989
Total	22,094,442	23,733,058	12,130,450	9,122,609	4,766,800
(Percentage of forest area damaged by fire)	(23.7)	(25.5)	(14.2)	(10.7)	(5.6)

Note: By aerial inspection

*Source: Forest Fire Control Division, RFD, 1997*

percent of all forests, had burned. The development of and improvements to systematic and continuous forest fire control measures and operations have helped to reduce the extent of the damages done by forest fires, with only five million *rai* of forest having been damaged by fire in 1994 (Table 3). In the North, the scale of forest fires has been particularly damaging due to the relatively dry weather in the summer. Fighting forest fires is one of the RFD's major activities, and therefore, important sources and uses of budget.

## 2. EVOLUTION OF FOREST POLICY

Prior to the first National Economic and Social Development Plan (NESDP) of 1961, Thailand's forest management was covered by the Forest Act of 1941 (amended in 1948, 1982, and 1989). Instead, it was primarily concerned with controlling the logging and harvesting of forest products. The functions and activities of the Royal Forest Department were mainly related to the extraction of forest resources and for the most part, as was mentioned earlier, still are. The 1941 Act reflected the fact that Thailand still had abundant and vibrant forest areas, but beginning in 1961, the NESDPs began to progressively reflect the fact that substantial declines in forest area had occurred and that forest conservation and replanting were becoming increasingly essential activities. Other major laws relating to forest conservation include the 1961 National Parks Act, the 1964 National Forest Reserve Act, the 1992 Forest Plantation Act, the 1960 Wildlife Preservation and Protection Act (amended in 1992), and the 1992 Na-

tional Enhancement and Conservation of Environmental Quality Act.

The first explicit goal for forest conservation was set out in Thailand's first NESDP of 1961, which set the target for forest cover at 50 percent of Thailand's total land area, or 160.5 million *rai*. That year, the Cabinet passed a resolution classifying just over 50 percent of Thailand, or 162 million *rai*, as "permanent forest areas." However, the first Plan also allowed forests to fall to 40 percent or 128 million *rai*, of Thailand's area in order to accommodate population increases and the conversion of forestland for economic activities. At that time, it was estimated that 58 percent of Thailand was under forest cover. Between 1961 and 1992, the Royal Forest Department issued over one thousand Ministerial Regulations declaring some 147 million *rai* as forest reserve area. However, some 17 million *rai* of this has since had its status revoked in order to provide land for the rural population and dam construction.

Thailand did not have its first comprehensive National Forest Policy until 1985. This policy aimed to maintain the 40 percent target for forest cover. Of this 40 percent, only 15 percent was to be kept as conservation forest area. The conservation forest areas included first class watersheds, national parks, and wildlife sanctuaries. The other 25 percent was classified as economic forest area. The continued deforestation in Thailand, especially in the mountains, has been cited as the source of many disasters including the 1988 flood in the south of Thailand where deforestation was claimed to cause landslides which resulted in disastrous damage to

the area. This was a major impetus behind the enactment of the 1989 ban on logging. At this time, the government also decided to reverse the ratio of conservation to economic forests such that 25 percent of the country would be designated as conservation forests and 15 percent as economic forests.

In Thailand, a number of government agencies are responsible for and have direct authority over the management of natural resources. These agencies and their functions include: the Royal Forest Department, which manages forest resources; the Royal Irrigation Department, which manages water resources; and the Department of Mineral Resources, which manages minerals, energy, and groundwater. This type of resource management, by separation into specific departmental functions, can create the potential for specialization of skills and support for the rapid extraction of the resources for consumption, use, and income generating activities. However, this mode of functional and unrelated management is currently under severe stress because the activities involving the extraction of natural resources can actually have devastating effects on the environment. As a result, the practices and policies of these departments are now being questioned, and the departments face a substantial challenge in re-aligning themselves to face their new mandates of environmental protection and natural resource rehabilitation. Moreover, frequently overlapping mandates and conflicts between production-oriented and protection-oriented agencies have emerged and are causing even more stress to the already fragmented system of resource management.

In practice, the watershed unit has not served as the basic management unit for natural resources in Thailand. The collection and reporting of environmental information is usually gathered according to administrative boundaries.

The rapid rate at which Thailand has been losing its forest cover during this century has prompted successive Thai governments to establish policies for increasing forest area. This began in 1961 with the first National Social and Economic Development Plan (NESDP) and continued in each subsequent plan. The first plan emphasized the establishment of commercial forest plantations. More recently, the multiple roles of forests for conservation, research, and tree seed production have become increasingly con-

sidered in the evaluation and decision-making processes of reforestation programs. Reforestation of upper watersheds has been an important activity of the RFD since the 1970s.

From 1906 to 1996, the Royal Forest Department (RFD) planted 5.4 million *rai* of forests (Mingsarn and Pornpen, forthcoming 2000). Yet, this amount is negligible compared to the 89 million *rai* that has been lost. Despite the importance that the government claims to place on the management of forest resources and reforestation, the budgets allocated to the pursuit of these goals have been pitifully inadequate. Principally due to budget limitations, the Royal Forest Department was only able to replant one-third of the target area that was set out to be reforested in the two NESDPs covering from 1982 to 1991.

### 3. THE STATE VERSUS COMMUNITIES

The RFD was established in the reign of King Rama V, with the primary purpose of revenue extraction from timber production. Towards the end of the eighties, the role of the RFD changed from a production and revenue-orientation to a conservation-orientation. This has led to heightened conflicts between the RFD and the communities residing in the forests. The major conflicts (Anan and Mingsarn, 1995) stem from three key problems. The first problem is the two group's different interpretations of the word 'forests.' The second is due to difficulties resulting from new limitations placed on the use of forest resources, especially land, and the third is a result of the expansion of National Parks and Wildlife Sanctuaries.

Enacted at a time when land was abundant, the Forest Act B.E. 2484 (1941 A. D.) specified that any land without established ownership rights (granted according to the Land Act) were to be designated as 'reserve forests.' Since the Forest Act empowers the RFD to manage all public land that is 'reserved in the form of forests,' the implication of the Forest Act was to direct all public agencies, requiring land for development, to the RFD for approval of their land requests. In considering these land requests, the RFD was supposed to consider all the environmental factors involved. However, a standardized set of environmental criteria for appropriate land uses and activities, such as would be set out in a watershed

classification, was not developed until much later. Thus, although many land areas were designated as 'reserve forests,' this did not guarantee that land use decisions were made according to a standardized set of environmental criteria for the development and use of these designated forest areas.

In defining forest areas, rural farmers, tend to consider forests as 'land with big trees.' Therefore, once the trees or forests were gone, the land was then considered 'public,' or open for common use. As a result, once logging concessionaires cleared forest areas, farmers would settle onto what they considered as new public lands. Thus, the population in newly deforested areas increased further and put more pressure on the land and resources in the public land areas.

Further complicating matters is the manner in which the 'forest reserves' were demarcated. A careful review of the historical records of eight Northern forests revealed many errors in the original demarcation process, and while there was a lengthy process carried out, it was by no means thorough. This was predominately because it was carried out by officials, who in the early days, traveled by foot and in carts (Anan and Mingsarn, 1995). Despite the fact that earlier problems have been corrected using more modern technology, such as aerial photographs, swidden fields<sup>1</sup> are still not recognized as having rightful and legal owners. Thus, both the rightful users who, according to the forest and land laws, had been in the forest prior to demarcation, and the customary users, who have become illegal squatters under the forest laws, inhabit the Thai forests. Separating the two groups into those having lived in the forest before the forest reserve was demarcated and those entering after has been an almost impossible task for the RFD.

Prior to the logging ban, the eviction rate of squatters from the forest reserve areas was low, ranging between one and 7.6 percent (Yongyuth and Feder, 1986). At this time, the RFD was more concerned with illegal cutting than with the use of public land (Anan and Mingsarn, 1995). This trend began to change after the logging ban was implemented in 1989, which was accompanied by new limitations to and stronger controls over the uses of forest products and resources.

In the decade that followed, there was a new and marked expansion of National Parks and Wildlife Sanctuaries. Increasingly more forest reserve areas were being designated as National Parks and Wildlife Sanctuaries, and the laws encompassing the two areas became much more stringent. For example, according to the National Park Act, not even one pebble nor stone could be removed from the National Parks, and further, since the Wildlife Conservation and Protection Act of B.E.2535 (1992) adopted a wilderness approach, the stance became very anti-people and anti-settlements oriented. Moreover, since the budgets allocated for National Parks and Wildlife Sanctuaries were, and still are, relatively better funded than 'forest reserve areas,' there was an incentive to have as much forest reserve area, as was possible, re-demarcated as National Park area or as Wildlife Sanctuary area. For example, about 0.43 baht (slightly over one cent) was allocated to protect national 'forest reserve' areas in Lampang during the mid-nineties, while double that amount, per unit of area, was given to the Wildlife Sanctuaries in Huey Kha Khaeng (Anan and Mingsarn, 1995).

Since the late eighties, communities and settlements in Thai forests have become a major concern for the RFD. Yet, the Department has not been armed with the right expertise to deal with people issues. Even within the different divisions of the RFD, the treatment of the squatters varies significantly (Anan and Mingsarn, 1995). In comparison to the National Parks and the Wildlife Sanctuaries, which are backed by tough laws, the Watershed Management Division has had more opportunities to work with forest communities, such as in the Highland Development Projects, which have been sponsored by the UN and other foreign agencies (see more below). Overshadowing the implementation of forest laws, the decisions of the National Security Council can influence whether the forest communities will be allowed to remain in areas demarcated as forest reserves. This serves to create even more uncertainty in the RFD's role as an enforcer of forest laws and thus, tends to stall the RFD's willingness to become directly involved in community participation and new enforcement measures.

In Thailand, the conflicts over forest land between the people in forest settlements and the government are of great significance because over one million rural households are believed to

inhabit the current forest reserves. Successive governments have failed to resolve the numerous conflicts between communities and the state over the status of land and forests. The preparation of the most recent National Forest Master Plan was assigned to a foreign consulting company and this was met with bitter protests because it failed to raise the issues, or to provide a set of concrete guidelines, that might lead to fair solutions. As a result, the prepared plan draft has never been announced, nor adopted.

As is evidenced by the statistics showing an ongoing decline in Thailand's forest cover, attempts to heighten conservation efforts have not been successful. Thus, one of the conclusions that must be drawn is that the state has proven itself unable to meet the challenge of forest conservation. Currently, there is a proposed Bill which aims to partially restructure the way forests are managed in Thailand. Using community forest management, the Bill aims to solve some of Thailand's forest management problems by transferring the responsibility of forest use and conservation management into the hands of the community. Although serious efforts to enact a community forest law in Thailand is only a few years old, and is mostly based on the initiatives and proposals made by community representatives, academics, and NGOs, when it is finally enacted it will be the first Bill in Thailand to involve the public at large in the law-making process.

The government carried out a series of public hearings on the subject, which ended in 1997. Substantial changes, which further defined where community forests could be located and the activities permitted within them, were made to the Bill because of these hearings. A major addition to the Bill was the appointment, by Cabinet, of a National Committee for Community Forest Policy, which would be responsible for setting the policies and regulations governing community forest conservation and use. This addition has been criticized by the NGOs as being little more than an attempt by the state to strengthen its control over the management of community forests; an action that runs counter to the basic principles behind the need for community forests in the first place. However, subsequent to the hearings conflicts arose between two distinct NGO camps that disagree over the contents of the Bill. One group favors a stance of strong environmental conservationism while the other wants to emphasize communal rights. These dis-

putes call into question the type of areas where community forests should be allowed, as well as, the nature of the activities permitted within the community forests. The proposed Bill is expected to receive even more modifications and has yet to be made a law in Thailand.

#### **4. WATERSHED PROTECTION IN THAILAND**

Towards the end of the seventies, as population pressure continued to increase in the upper watersheds, the Watershed Management Division began to realize the potential of community management. Using community management, the Division was able to pursue their desire to stop shifting cultivation and promote sedentary agriculture by aligning these goals with the decisions and priorities of the community. Also during this time, a separate program was initiated that involved funding from international agencies for the replacement of opium crops. This program was introduced as an integrated approach to highland development, and the funding came mainly from the United States Agency for International Development, the United Nations, and other international organizations. The specific project areas were located in the mountainous regions or highland areas that were not defined by catchments, and where opium crops had been predominately grown. For these projects, opium replacement was the core interest, and as a result, ecological functions were not emphasized. However, while the preservation of ecological functions was not initially considered, at a later stage, some of the highland projects began to experiment with soil conservation. Furthermore, due to the concerns of the King, who introduced vetiver grass for erosion control, the emphasis on soil conservation was intensified.

While it appears that these projects encompass ecological 'water' considerations, the term 'soil water conservation' refers to a type of soil conservation, which considers soil erosion that occurs as a result of water erosion. This is quite different from the water yield concerns related to ecological systems. Thus, although soil water conservation is often mentioned in many project documents, it is actually soil conservation that is the key interest.

In terms of water gaining significance in other matters of environmental management, until repeated droughts in the 90s, most Thais believed that Thailand was abundantly endowed with all three resources of land, water, and food, therefore, water was never placed among the top environmental concerns. However, a recent study indicates that, although it is still largely believed that land and food are ample in Thailand, the abundance of water is being questioned (Mingsarn and Pornpen, forthcoming 2000). Thus, increasing water concerns from the public has brought water issues to factor more prominently on environmental agendas.

To meet greater food needs and to increase cash in compensation for the loss of opium crop income, water using crops and technologies have been transferred to the highland farmers, mostly including the hill tribes. High value crops such as sub-temperate and temperate fruits, flowers, vegetables, irrigated rice, and even aquaculture were introduced in the highland tribal areas. Then, during the eighties and nineties, the second-generation impacts of sedentary farming began to show. The first impact was in the form of soil erosion, and later, the second impact was seen in the declining water yields of highland watersheds. Yet, there are still integrated development projects (see below) which continue to promote the most water intensive crop, irrigated rice, despite the fact that one kilogram of rice uses 5,000 liters or five cubic meters of water.

Although the control of water flows and water quality is seen as the major benefit of watershed protection, water yields have not been regularly monitored. The Forest Environment Research Division of the Forest Research Office has eight research stations in the North, these include, four stations in Chiang Mai, two located in Nan, and one in each of Chiang Rai and Phrae. This partitioning of watershed protection activities within the RFD, between the National Park Division, the Watershed Management Division, and the Forest Environment Research Division, could actually prevent an effective overall assessment of the status of the natural environment in a watershed. This is because without routine coordination and data linkage procedures between research and implementation, there is no way to measure the net successfulness of watershed management at the catchment level.

While there are two other agencies that measure stream flows in the upper watersheds, namely, the Royal Irrigation Department and the Electricity Authority of Thailand, these agencies' jurisdictions are generally limited to areas where a new dam is expected to be built. This effectively means that there is no real water resource management-monitoring program in the watershed. While, as was said, the RFD does monitor water output from eight different stations in Thailand, this output information is not used as a part of watershed ecosystem management. Thus, the water monitoring performed has done little to advance the knowledge required for ecosystem management.

In the nineties, an integrated community approach has been adopted as a means to stop deforestation and to improve the standard of living for the people who depend on the forests. Within the RFD, the Watershed Management Division now understands the importance of including people and communities when looking for solutions to forest management issues. However, these lessons were often hard learned, and as one unit chief explained during the workshop, "I have wasted two years studying land capability and land use planning. That led me astray for 20 years. I should have studied people's capability!"

Today, at the field level some Watershed Management Unit chiefs have learned the potential of including the forest dwellers such that, "[w]hen a sense of belonging to their habitat can be created, communities can look after the forests... the RFD cannot guard the forest 24 hours [a day]." Thus, at least at the field level there is a growing understanding that in order to succeed in watershed management, the focus must begin with the community's ability and desire to participate because only then will plans for land use be realized.

As a result of resource competition, social conflicts have also increased and intensified during the 1990s. Although, the contraction of irrigated areas in the lowlands suggests that lowland farmer's complaints of dwindling water resources is warranted, the lowland farmer's belief that they are competing with upland farmers for water resources has led to an escalation of conflicts. Currently, there is only one study that computes the cost of water competition. This study is a joint research project between the

Harvard Institute of International Development (HIID) and the Thailand Development Research Institute (TDRI). It examines the 20-year data of monthly stream flows from the Mae Taeng watershed. The study reveals that the dry season crop areas declined from about 100,000 *rai* in the late 1960s and early 1970s to about 40,000 *rai* in the late 1980s and 1990s. After allowing for the variation in rainfall, regression analysis shows that on average, 3 million cubic meters of water have been retained by the

upper catchment (Vincent and Mingsarn, 1993). This calculates to be an economic loss for the lowland farmers of between 26 and 93 million baht per year, depending on the year.

The study also provides two explanations for water retention in the higher watershed: first is the replacement of grassland with pines (*Pinus kesiya* and *Pinus merkusii*) and other fast growing species which consume more water in the dry season; and the sec-

### Box 1. Forest for water: What is the evidence?

About half a century ago, dense forests covered the northern watersheds of Thailand. Commercial forestry, population growth, and expansion of agricultural commercialization have produced a mosaic of complex landscapes, even in the upper watersheds. At the same time, water shortages in the dry season have led many to look for explanations. Deforestation is believed to reduce water yields and create a more uneven distribution of rainfalls. These beliefs have become the underlying assumption for forest-for-water-policies in Thailand.

The evidence of reduced rainfall due to deforestation is circumstantial with few rigorous statistical supports and does not take into consideration the large-scale weather patterns (Bruijnzeel 1991). Most long-term studies have not been able to detect any statistically significant trend between rainfall and deforestation. However, a rigorous simulation study of large-scale tropical forest conversions to (degraded) pastures, which included the types of conversions typically carried out in the Amazon regions, shows that this could increase temperatures and reduce rainfalls and evapotranspiration by about 26 to 30 percent (Shukla et al. 1990, cited in Bruijnzeel 1991). Moreover, although the link between deforestation and precipitation is yet to be proven, upper montane forests, known as the cloud forests, tap atmospheric moisture through the canopy and provide extra water yields of between five and 20 percent of the annual rainfall. Rainfall in Thailand is largely monsoonal and there has not been evidence of a clear pattern or a statistically significant relationship between annual rainfall and forest areas. Thangtham and Suthipol (1989) found a negative correlation between rainfall and forest areas in Northern Thailand and a positive relationship between forest areas and the number of rainy days.

Another widely held conviction regarding the hydrological role of forests is that forests act as a sponge, which absorb water in the wet season and release water in the dry season. This belief disregards the fact that much of the water in the root zone will be used for growth and development process of the trees themselves, and the bigger the trees, the greater is the required water intake. Moreover, mature forests with trees of large canopy sizes also cause greater interception loss. This is because part of the rainfall captured by the crown canopies evaporates into the atmosphere. Thus, contrary to such a conviction, a paired catchment experiment in Malaysia revealed that the total stream flow increased during the first three years after the removal of tropical rainforest. A study performed on Costa Rica indicates that soil moisture contents were highest for a large scale clearing compared with undisturbed forests, both in the first and the second dry season (Bruijnzeel, 1992).

The net impact of deforestation on water yields would, amongst other factors, depend on the type of vegetation and land use that replaces the forests. Replacing deciduous forests, which characteristically stop growing in the dry season, with evergreen or another type of fast growing species tends to reduce the total stream flow in the dry season and will reduce water yields from the catchment. A 10 percent reduction in the vegetation cover of conifer and Eucalypts increased water yields by 40mm on average, and 25 mm for the reduction of deciduous forests (Bruijnzeel, 1992). In an attempt to stop deforestation, the substitution of shifting cultivation with sedentary irrigated agriculture, especially with highly water intensive crops such as irrigated or terraced rice, might have adverse implications on water yields.

These facts should not give the impression that water yield is the only primary objective of watershed management because watersheds might be managed to maximize a particular function or service depending on the relative advantages and needs of the basin. Nor do they imply that water should be kept for the consumption of the lowlanders at the expense of the highlanders. What is needed is a proper understanding and accounting of the impacts of forest conversion and land use change on upper watersheds so that policymakers can make well-informed decisions. This is especially so, when tradeoffs are involved and all water users can benefit from access to better information and data in order to make well informed trade-off decisions on a sound scientific basis, rather than on traditionally held convictions.

The first step would likely be a review of all the scientific studies done in various parts of the world that most resemble the situation in Thailand. Then, further studies can be designed to fill in the knowledge gaps. In so doing, other environmental variables should be taken into account so that the impacts of the tradeoffs are considered. It is also important to remember that in a large basin, with heterogeneous land uses, a full-scale and exact accounting of the effects of forest conversions will not be an easy task.

ond and more important factor is the expansion of irrigated rice farming in upper watershed areas.

Water conflicts were further exacerbated by El Nino, which peaked in 1998. Local lowland farmers in Chom Thong blocked a highway leading to Doi Inthanon National Park because they believed that the highland farmers had used up all the water, which should have been flowing into the lowland. Several other protests, including the burning of effigies, followed the initial episode and the issue has become so politicized that it is difficult for anyone to resolve it without a systematic water monitoring procedure by a third party. Despite the fact that there are 30 water laws in existence in Thailand that relate to water problems, there is not a single water law that can be applied to this specific problem. In Nan, despite the fact that this is really a water problem, the lowland farmers try to utilize the forest law, under which the settlements of the upland farmers are considered to be illegal, in order to have the upland farmers removed. Thus, instead of trying to work out water use issues, they pressure the authorities to apply the forest laws and in the process, there has not yet been any advancement toward constructing a 'basin level management' that could effectively deal with water use issues.

These water conflicts have led the Watershed Management Division to think more about the hydrological functions of watersheds. In mid-1999, recognizing the magnitude of the effects these water issues have on Thailand, the Director General of the RFD demanded information on the sources and contributions of water resource conflicts in problem areas in terms of data and facts. The Director General specified that the watershed chiefs must gather data on the possible contributing factors to the conflicts including: water yields from each major watershed; the relationship between the forests and water; changes in the land uses of the upper and lower watersheds over time; and the impacts of El Nino. Even within the RFD, there is now a growing realization that an understanding of the hydrological functions of the watershed is likely to be a key factor for watershed protection in the future.

Although within the RFD, some officials have begun to recognize that the sustainable and successful management of for-

ests, especially if peace is to be maintained, must include the forest communities' participation in forest decisions and activities, everyone in the RFD does not hold this approach to forest management. Typically, the top-level officials, who have not been in a situation of actually enforcing forest laws in the field, tend to see the participatory aspect of forest management as a type of public relations activity rather than a serious mandate. While these non-field level officials do not begrudge and in often cases laud this method for field level enforcement, they do not officially recognize community participation as a major principle of the RFD. They tend to carry out their own duties without realizing the same potential benefits might result from community participation at their levels of duties. However, a key difference between the field level's duties and the non-field level officials' duties is that the top-level officials tend to focus on responding to the societal and policy demands coming from a sector of the population that is very different from the forest dwellers. Thus, it is very much due to the different aspects of their duties, as well as, the groups that the officials must respond to that community participation is viewed with varying levels of importance within the RFD.

However, looking toward the future of forest management in Thailand, there appears to be three recent developments that might suggest all officials in the RFD, regardless of the particular groups they tend to deal directly with, will have to pay particularly close attention to, and perhaps, integrate community participation in carrying out their duties. This predicted change in management style is signaled by three recently evolving departures from resource management norms in Thailand, which have effectively laid the initial incentives and means for community participation.

First, the King and the Queen of Thailand are anxious to see that people and forests co-exist peacefully. Both have initiated a number of integrated development projects that allow sedentary agriculture, as well as, generate employment. Thailand is among few countries where the monarchy still has substantial influence on the country's development paradigm, such as with the improvements in health and education guidelines.

Second, the new Constitution of Thailand has initiated the legal rights and responsibilities for Thai citizens and communi-

ties to participate in the process of natural resources management. Specifically, the Constitution, promulgated in 1997, provides rights for citizens to participate in activities involving the utilization and conservation of natural resources and the environment, as well as, the rights for communities to conserve customs and resources, rehabilitate customs, indigenous knowledge, arts, and culture, and to participate in the management, maintenance, and the sustainable use of natural resources.

The third indication is that at the field level, the means, or tools now exist, such as participatory land use planning (PLP)(see Box 2), for the RFD officials and the forest communities to come to an agreement on land use. The initial experiments have achieved many successful and encouraging results and thus, have already led to the establishment of more projects of this kind (see more below).

One of the biggest constraints to effective watershed management in Thailand is a lack of knowledge (Box 1). There is an absence of knowledge on watershed services and functions in Thailand. For example, it is widely, albeit incorrectly, held that forests generate rain and therefore increase available water quantities. This belief is held despite the fact that the rain in Thailand is mostly monsoonal. Studies conducted in the Northeast (Tangtham and Sutthipibul, 1989) and in the North (Alford, 1992) indicate that

there is no relationship between the amount of rainfall and the amount of forest cover. There are few studies available on the impact of vegetation cover and runoff, or about the water consumption levels of different species and vegetation types. This is predominately because research has been given a low priority for funding in Thailand. It is clear that the hydrological functions of forests is not well understood, let alone appropriately managed, and therefore, it can be concluded that watershed management in Thailand is still a long way away from attaining a comprehensive system of ecosystem management.

The RFD is often painted as a dinosaur or dubbed ‘Deforestation Department’ by the NGOs and the mass media. However, the fact is, the history of the RFD demonstrates that it has indeed changed, albeit very slowly. While further and more drastic changes are needed to reform the RFD, its past suggests that it is possible for the RFD to adapt to the public’s changing expectations of the department. However, implicitly required for the RFD to change, are substantially more scientific inputs, research, and training. Only with these tools can the department successfully take on the challenges it faces for change.

### Box 2. Participatory Land-use Planning

Participatory land use planning is a method of negotiating competing claims to resources and is helping upland villagers to develop sustainable land management practices, especially through community forest schemes. Steps are to be undertaken as follows:

Step 1. Preparation	Site identification and collection of maps, aerial photos, and interpretation (R)
Step 2. Survey	Spot check, mapping verification (R/C/FA)
Step 3. Adjustment	Utilization base map of land use and tenurial status (FA/C/CO)
Step 4. Application	Application of land use map to work as a communication tool and education process towards active participation in community forestry (C/CO)
Step 5. Agency design	Land use design of RFD following adaptive feasible pattern of land use under policy framework (C/RFD)
Step 6. Design and Negotiation with Community	Operationalizing land use design through the participatory process, in which local community and RFD negotiate and agree on final land use pattern designs (R/C/CO/RFD)
Step 7. Operation	Land use and community forestry development operationalizing through participation of local organizations and target households

Notes: R = Researchers, CO = Community Organizer, FA = Field Analysts

**Table 4. Change in the land use in the SM-HDP between 1984-1991**

Land use type	Percentage change 1984-1991
Intensive annual cropping	+60.5
Total Forested Area	+139.4
Reforestation area	+67.4
Shifting cultivation	-84.4

*Source: Uraivan, Samer, and Gillogly, 1994 p. 58*

## **5. NATURAL RESOURCES MANAGEMENT IN THE HIGHLANDS OF NORTHERN THAILAND**

Traditionally, agriculture in Thailand's highland areas has followed the practice of shifting or swidden agriculture. This is one of the most sustainable forms of land use for the highlands when lands are abundant. However, because it requires a section of land to remain fallow for 7 to 9 years subsequent to cultivation, a lot of land per household is required. For the subsistence production of upland rice, 3 to 4 *rai* of land is required per head. Once the amount of land to be left fallow is included, 30 to 40 *rai* of land is required per head. This system is sustainable for a low population base and an area with low population growth. However, the increases in population in recent years, have led to a reduction in the time that land is left fallow, and now, with as little as 2 to 5 years for fallow time, the forests, soil, and environment have become degraded, and the land productivity and families' incomes have decreased substantially.

The highlands of Northern Thailand were a part of a center of opium production known as the notorious "Golden Triangle." Since difficult accessibility and rough terrains are not detrimental to the production of opium, the final product, which is highly valued, is easy to transport. The spread of the output from the Golden Triangle raised concerns from the international communities, and in order to control opium production, the United Nations, and several other foreign governments initiated supports for the development of alternative crops. These alternative crops typically included: food crops with high yields, such as paddy rice, which produces higher yields than the traditional upland rice crops;

as well as, other alternative cash crops such as sub-temperate vegetables, flowers, and fruit trees.

Growing higher value crops, especially tree crops, require greater investments in cash, time, and labor. These additional investments, on the part of the farmers, implies the need for land security, and while land use rights for highland communities remains unclear, the arrival of the development projects in the highlands has provided not only new technologies, but also as will be detailed later in this section, serves as a form of indirect land security for the highland farmers.

Most development projects that took place in Northern Thailand adopted the integrated development approach, which was introduced in the early eighties by the United Nations. Although most projects receive financial assistance from foreign governments and NGOs, the Thai government provides substantial support in most cases as well. Soil and water conservation are important aspects of two large projects, the Thai-Australia Highland Agricultural and Social Development Project (TA-HASDP) and the Thai-German Highland Development Program (TG-HDP). Both of these projects also have social aspects in trying to strengthen local governments, improve local management capacities, and improve living standards by increasing crop production. The UN-Sam Mun Highland Development Project (SM-HDP) also seeks to encourage the development of communal organizations, with the specific goal of facilitating communications between communities that share the same watershed and thus, are trying to avert potential resource conflicts. Care International is a NGO with the highland projects that aims to create links between community organizations and government agencies in order to help improve the existing farm systems and to make them more sustainable. The Royal Project was the leader in developing agricultural

technology. The Royal Project aims to help introduce new crops, mostly fruits, vegetables, and flowers due to the economic potential of these crops. In order to maximize the farmer's benefits, support for the marketing aspects, and appropriate input use methods for the new crops have been developed.

As was indicated earlier, the integrated development approach to watershed protection in Northern Thailand began as an opium replacement project in the seventies. The first project was executed in the Mae Chaem watershed in early 1970. At that time, the Watershed Management Unit took on a small role by merely constructing roads and reforestation. However, many of the initial advances in watershed protection were reversed as foreign funding expired in 1979 and project spending evaporated. This resulted in a loss of more than 10,000 *rai* of forest area from deforestation in one year, due to an increase in forest resource dependency, as job opportunities fell and incomes fell. Thus, the negative effects of the funding decrease multiplied through the communities and affected the forests. To protect reforested areas, the Watershed chiefs have had to take on the role of community developers. Under the Queen's patronage, handicraft employment was also introduced to improve the income earning opportunities for women.

Along with the community development network, there was also a network of village committees established which included 12 villages in the Mae Chaem watershed. The watershed unit chief introduced this watershed network consisting of village communities, such that the village committees could participate in determining village boundaries and agricultural land uses in cooperation with their village folk and the watershed officials. This land use plan then became an unwritten agreement between the village folk and the foresters. In fact, this arrangement has become an important aspect of the implicit trade-off between land use security and cessation of shifting cultivation.

The experience of the earlier phase of integrated development in Mae Chaem was replicated in the Mae Taeng watershed under the SM-HDP Highland Development Project. The concept of an 'interface team liaison person,' linking the RFD officials and the villagers was employed in Mae Chaem. This concept was also used in Mae Taeng, except, the position was called a 'community

organizer,' and was later used in the Upper Nan Watershed Management Project. The SM-HDP in the Mae Taeng catchment took integrated development a step further by producing three-dimensional models of land uses to facilitate discussions and negotiations with the villagers. The SM-HDP in the Mae Taeng catchment village network and the community rules for sustainable use of forest resources became well known in Thailand. The latest project, which is the Upper Nan Watershed Management Unit, adopts the earlier techniques of participatory land use planning (PLP) (see Box 2.), and uses a liaison person, as well as, a village network for forest protection. They have also taken PLP a step further by attempting, not only to involve the communities in the planning of the sustainable resource use, but also by trying to institutionalize the plan as a part of the local administrative system.

During the study's workshop with the Watershed Chiefs, not only were conventional success indicators proposed, such as increases in forest cover, but also, other indicators for the success of watershed protection efforts were proposed. These included, first, the willingness of the villagers to reduce swidden fields, such as when a local Karen community in Mae Chaem voluntarily reduced their field rotation by one year in order to return the land to forestland. This land would otherwise have been included in the village's fallow land rotation, but instead, it could not become restored forest area. A second indicator proposed was the willingness of the farmers to help the RFD officials in putting out fires in the natural forests. This willingness on the part of the farmers to aid in forest protection is a relatively new phenomenon, and the Chiefs pointed out the case of Mae Taeng as proof that this can be considered an accurate indicator of success.

The following sections provide information details on the two projects used as case studies. These are the UN-Sam Mun site, where earlier efforts of watershed protection and sedentary agriculture experiments were carried out, and the Upper Nan Watershed management Project, which is a new project, supported by DANCED.

## 5.1 UN-Sam Mun Highland Development Project (SM-HDP)

The SM-HDP covers 60 villages, with a population of 11,256 people, in the two Provinces of Chiang Mai and Mae Hong Son (UN/Thai DM-HDP Final report 1987-1994). The Project includes seven Watershed Management Units. The forests within the watershed areas of the SM-HDP are hill evergreen, deciduous, dry dipterocarp, and pine. The watershed catchments are classified as 1A, 1B, and 2, which means they are to be conserved as watershed forests with little or no human activity. However, some communities have been living in these areas for over 100 years. The communities traditionally practice swidden agriculture and consist of diversified groups of ethnic minorities.

The SM-HDP, established in 1987 with support from the United Nations Drug Control Program (UNDCP), has two main objectives. The first is to stop the cultivation of opium poppy. The second is to help mitigate the worsening deforestation and initiate rehabilitation of forests in the area. The UN introduced an integrated approach to highland development in the early 1980s, and this model has formed the basis for all UN-supported programs since.

Before the establishment of the project, conflicts between the state and communities were on the rise owing to the eradication of opium fields. Also, land claim issues between the RFD and the communities over whether specific areas were forest land areas (according to the RFD) or traditional swidden field areas (according to the communities). To harness co-operation between the villagers and the RFD officials, a tool was required for, first, communicating land use patterns and needs, and second, for helping highland villagers develop sustainable land management practices. Central to harnessing this type of co-operation is a development tool called participatory land use planning (PLP) (see Box 2). PLP was initiated in the area and was designed to become a "Tripartite Partnership System," involving the RFD, communities, and the Chiang Mai University/Resource Management and Development Project (RMDP). The RMDP's role was to serve as a catalyst that would provide information and ideas to both, the RFD, and the highland communities. Local communities, through the establishment of

watershed networks, also geared the project towards developing a sustainable watershed management system.

Indicators used to gauge the success of the project are as shown in Table 4. From 1984 to 1991, the area under swidden cultivation was reduced by 85 percent, while the amount of forest area was increased by 139 percent (Table 4). Opium cultivation was reduced by 50 percent and continued to demonstrate decreasing trends, while the average nation-wide reduction was only 30 percent (Uraivan, Samer, and Gillogly, 1994). Two watershed networks that provide opportunities for controlling the offsite effects between villages have been developed, these are the Nam Sa Watershed Network and the Mae Rak-Mae Lao Watershed Network.

The motivations for the communities' co-operation with the RFD, as well as, how communities assess project successfulness are indicated in the following case studies of the two villages of Huey Phra Chao and Khun Sa Nai.

### *a) The Village of Huey Phra Chao*

The Village of Huey Phra Chao is a Karen village situated about 900 meters above sea level. It is located in the Mae Taeng Watershed, a 1,954-km<sup>2</sup> catchment basin, about two hours from Chiang Mai, which is a major city in Northern Thailand. The Mae Taeng Watershed is composed of 65 sub-basins and 790 first order streams, most of which are perennial. Water from the Mae Taeng Watershed drains eastward into the Ping River and is collected in the Bhumibol Reservoir, the largest dam of Thailand. The Mae Taeng Watershed contributes 11 percent of the total annual inflow to the reservoir.

The village used to be located at the headwater, which was at a higher elevation about five kilometers from the present location. About two decades ago, the Watershed Management Unit of the RFD provided the new location for the entire village of eight families. Today, the Karen village has grown to 42 households with a total population of 210 people (five members per household), out of which around 70 are children under 12 years old. The village has a water supply system and has electricity. There is a

primary school in the village, which is operated by the Department of Non-formal Education, and access to telecommunication education is available. The present location was classified as a 'no-hunting area' (a form of wildlife reserve area), and has since been upgraded to a Wildlife Sanctuary in 1997. The RFD has a live-in female liaison staff member who facilitates communication between the villagers and the RFD. The village chief has completed six years of secondary education. The village is a member of the Mae Rak Mae Lao Watershed network.

The village is a success story for the RFD. Since the village's relocation, the surrounding swidden fields have gradually returned to secondary forests. Surrounding patches of secondary forests of different ages is evidence of this. Together with the RFD, the community has set up village boundaries, has selected a forested area of 50 *rai* at a lower elevation as a community forest, and has also set up community rules for the use of timber and non-timber forest products. The community provides strong fire prevention support and, also acts as guardians to protect 2,500 *rai* of headwater forests from intrusion by outsiders.

The relationship between the RFD representative (or community organizer) and the villagers has been amicable. When discussing the institution that lends support to the villagers, the villagers indicated that the RFD liaison officer is second to the village chief. The villagers indicated that she helped farmers with writing loan applications, as well as with infrastructural proposals. The previous Watershed Management Unit Chief, who was instrumental in moving the village and in providing the basic infrastructures, also ranked quite high as a 'dependable institution.'

The current Watershed Management Unit chief described the Karen people of Huey Phra Chao as traditionally peace loving, and nature and conservation oriented. They prefer their traditional ways of life within nature rather than seeking employment in town. Only half of the households have opted to have electricity and there are few televisions in the village.

The secret behind the village's success story is that the RFD's objective of forest protection coincided with the people's objectives in the village. After relocation, the villagers were asked to

switch from growing upland rice to wet rice, which generally provides higher yields. The villagers also turned to commercialized farming and the production of Miang (*Camelia sinensis*) to generate cash income in compensation for reduced productions of upland rice. Although farmers were given some paddy land to grow transplanted rice, the paddy land is limited and the productivity of transplanted rice in the village is not high. In fact, it is reported by the villagers to have yields that are 10 percent lower than the upland rice yields. Thus, with the output from transplanted rice is insufficient to meet year round consumption, and the population of the community rapidly increasing, rice has to be bought using cash income earned from Miang sales.

Since the Miang shrub or Ton Miang is in the forest, protecting public and personal property has become the same objective for the villagers. Improved access to markets and opportunities for increasing cash incomes reduces the need for subsistence farming as a means of food security.

The production of Miang as a cash crop was undertaken before the relocation on a limited scale. In the production process, mature Miang leaves are picked, steamed, left to ferment, and wrapped in bundles for sale. The better quality Miang products are used as stimulant similar to kat (*Catha edulis*), which is consumed in some African countries. The young leaves can also be used as tea leaves. Initially, Miang was collected from the wild but nowadays farmers grow them from seeds. In the earlier days, prices were low and transportation was difficult because farmers had to walk with Miang on their backs for days to sell the produce. After relocation, access to markets improved, and farmers were allowed to grow Miang shrubs between the large trees in the forest reserves. Today, the village has about 200 *rai* of farmland, both paddy and upland fields, but 1,200 *rai* of Miang in the forests. If swidden agriculture is allowed then at least 4,000 *rai* of swidden fields are needed. Earnings from Miang vary considerably from household to household depending on the supply of labor as well as the number of trees grown. The net income earned from Miang production ranges from 5,000 to 30,000 baht per family.

The villagers were asked to indicate the changes to the environment, forest, and natural resources using a free-scoring

**Table 5. Success of Watershed Protection Viewed by Farmers**

	1989	1999
Forests	31 (100)	101 (322)
Water	64 (100)	28 (44)
Wild animals	31 (100)	12 (39)
Other NTFPs	21 (100)	10 (48)

Note: NTFPs refer to non-timber forest products

Source: *Participatory rural assessment*

method which counted the number of red beans as an indicator (the larger the number of beans, the better the conditions). These scores were then converted to an index of 100 for the year 1989. The results are summarized in Table 5, and the numbers, converted into percentages, are shown in the parentheses.

It is evident from the villagers' assessment that apart from tree habitat, most other ecosystem functions, which are not included as an objective of the Watershed Management Unit, have deteriorated. The situation seems to be the worst for wild animals. Thus, these forests are gained at the expense of the villagers' traditional land holdings. One of the villagers described the situation as follows, "I used to have two barns filled with paddies. Now the forests are back and my barns are empty." It is fortunate that the village can overcome the food security problems using cash income earned from Miang. However, now their food security, instead of being tied to the security of swidden agriculture, is tied to the land security for the production of Miang. However, even so, for some farmers protection of Miang, and therefore protection of the natural forest, may not be their first objective.

In the longer term, the Miang system may not be sustainable, not because of supply problems, but rather because of the demand for Miang. Miang is a traditional product, therefore, its demand may decline over time, as younger generations no longer consume the product. Thus, unless the market for Miang tea or other new high value products from Miang can be developed and expanded, the Miang in the forest system may not be sustainable.

#### *b) The Village of Khun Sa Nai*

Khun Sa Nai is a Hmong village situated at 1,300 meters above sea level. The village has a population of 524 people (out of which 75 are dependents) from 60 households. The population of

the village has grown very rapidly and the number of households doubles every decade. The village produces 60 new births each year. The village does not yet have electricity but some households have battery-operated televisions. Every household has a motorcycle and 37 households, or one-half, have a pick-up truck.

The farmers in this village used to grow upland rice and opium. To replace opium, high value crops such as vegetables and fruit trees were introduced by the SM-HDP. The farmers stopped growing opium in 1990 and participated in fire prevention to protect their fruit orchards. Today, the farmers grow paddy rice, cabbages, Chinese cabbages, ginger, lychees, peaches, and plums. The community manages 50 *rai* of community forest and 2,500 *rai* of headwater forest.

The introduction of high value horticulture crops has brought about new problems, such as the use of agro-chemicals (used intensively in Khun Sa Nai for cabbage production), soil erosion, water withdrawals, and water quality. With high value crops, the threat of cross-boundary fires has potentially become more damaging. These problems have broadened ecosystem management objectives and necessitated inter-village co-operation. The people of Khun Sa Nai that used agro-chemicals intensively must now abide by the network rules for water quality protection. In return, they are protected from unmanaged fires by the adjacent villages. Not being in the network or non-cooperation with other villages implies a potential disadvantage. Thus, a network of seven villages in the same sub-watershed was formed with common rules relating to the disposal of chemical containers, water use, firebreaks, fire protection, and the growing of vetiver grass for soil conservation. The Nam Sa Watershed Network also encourages pest control using only biological products.

The Nam Sa Watershed Network has been active in pro-

### Box 3. Civil Society Movements in Protecting the Watershed

Nan is well known for its tradition of nature conservation by local civil societies. Prior to 1975, when there were many logging concessions in the area, logging was believed to be the cause of droughts and prolonged dry seasons, as well as, the cause of hardship and environmental degradation. About 500 villagers from Ban Luang village attempted to stop the logging operations by protesting against the logging company. Villagers from three sub-districts (Tambon) formed a group under the direction of a local monk, Phrakhru Pitak, to protect the area from logging.

In a separate endeavor, river conservation efforts were taking place. Another monk, Pra Sawien Inpunyoh, of the temple of Don Gayoh, set up the first river conservation zone in 1988. The conservation area was about 100 meters wide and 100 meters long, and was established in front of the Temple. Since 1988, fish numbers have increased remarkably. Since 1988, 45 conservation zones similar to this one have been established in the Nan province.

In June 1990, Phrakhru Pitak performed the first forest ordination ceremony in the province of Nan at Bahn Khiew Muang. The community forest encompassed about 400 acres of land around their village. Letters were sent to the surrounding communities announcing the creation of the protected area, and that it was forbidden to cut trees or hunt in the community forest. The villagers still maintain their protected forest, and it is now seen as a model project and is visited frequently by visitors from across Thailand. Realizing that ecosystem management cannot be successful if it is only carried out in one localized area, Phrakhru Pitak began to spread the idea of forest ordinations across Nan.

In 1991, a new group of young people established the North Eastern Thai Association. Their initial aim was to help farmers change from swidden agriculture to more integrated approaches, as well as, more permanent land uses. Mixed farming was promoted where orchards and vegetables were grown, and a pond was dug to hold the crop irrigation water supply, as well as, to raise fish. In addition, cows and pigs were raised on a small scale.

All these people finally formed the Huk Muang Nan (HMN) Foundation in 1998. HMN is composed of a variety of loosely formed groups, NGOs, and other forms of organizations, some of which are supported directly by HMN staff or member groups, through campaigns to increase public awareness and participation.

protecting the environment within their boundaries. It was reported by the RFD Watershed Management Unit Chief that the speed at which the villagers managed problems was greater than if they had to report problems to the RFD first. For example, in 1992, 180 people of the three villages from the network stopped external invaders from encroaching the forests within two days and after only 20 *rai* of forest area was illegally removed. If the villages had first informed the RFD, it would have taken 10 days and 50 *rai* of forests would have been destroyed (Chaleo, no date).

The farmers were asked to participate in discussions on whether the environmental conditions had improved, and the results are presented in Table 6. The consensus is that with improved standards of living, the general environmental conditions have deteriorated slightly because of smoke from pick up trucks and water pollution from agro-chemicals. However, the incidence of forest fires has declined. The villagers were then asked to indicate the change in the conditions of forest, water, and wildlife between 1989 and 1999. The farmers indicated that the forests have recovered significantly because farmers have helped the RFD with fire protection and putting out fires. Fire protection is important for protecting their own fruit orchards. However, the farmers indicated that

having no fires is not necessarily preferred to having some controlled fires. They indicated that controlled or managed fires would reduce litter and prevent big fires, which tend to kill animals on a large scale and make the water unsuitable for drinking.

In regards to the extent that protecting the forests has helped in improving water yields, the farmers were told by the project persons that by saving the forests, water would be more abundant. They responded that this was different from what their ancestors had told them; that water comes from nature. In the last few years, forests have been rehabilitated but water has become scarce. The village chief thought that this was because of droughts, increased population, and competition for water by orchards. The farmers hoped that by growing more trees and saving forests, there would be more rain. The farmers added, “maybe when the trees are big, they will release water.”

This case study indicates that while the RFD continues to be singularly interested in fire control, the watershed protection objectives of farmers have widened to cope with changing situations. As in the first case study, growing commercial trees are important incentives for farmers in helping prevent fires and protecting

the forests.

Thus, both case studies indicate that allowing harvests from trees acts as an incentive for fire prevention and has a positive external effect on natural forests. Since private interests coincide with public interest, both forests and private trees are protected.

In both case studies, farmers are confused about the relationship between land use, particularly forests, and water yields. It is important that scientific-based knowledge be established for both the understanding of farmers and the RFD's effectiveness of administration.

## 5.2 The Upper Nan Watershed Management

The Nan River is one of the most important tributaries of the Chao Phraya River, contributing around 40 percent of its water annually. It originates in the mountain ranges of the Nan Province, which is one of the more remote and sparsely populated provinces of Thailand.

The Province of Nan is located in the eastern part of Northern Thailand, with Lao PDR on its eastern border. Nan covers an area of 11,472 km<sup>2</sup> and has a population of 460,322 (1996). Approximately 85 percent of the area in the Province is mountainous. Among the Province's diverse population, there are Thais, Tai Leu, Hmong, Mien (Yao), H'tin, and Khamu. The agricultural sector is the main source of income for the Province. Nan is also well known for its traditional practices of nature conservation (Box 3).

Far from Bangkok, Nan remained geographically and politically isolated until approximately 20 years ago when improvements to communications and transportation infrastructures brought Nan into closer contact with the rest of the country. This has allowed Nan to become affected by the social and economic changes occurring in the rest of Thailand. This has had positive and negative effects on Nan. On the positive side, health care has improved for many and incomes have increased. However, the negative impacts include: the depletion of natural resources; the disintegration of communities because of the commercial harvesting of timber; the commercialization of agriculture; the expansion of upland agricul-

ture; land speculation; and urban migration. Using the provincial standards for poverty levels, 32 percent of the population of Nan lives in poverty.

Historically, forests have covered most of Nan. In 1964, 87 percent of the Province, or 6,261,480 *rai*, lay under forest cover. However, by 1993, that figure had been reduced to 42 percent, or less than 3,000,000 *rai*. The RFD has estimated that the loss of forests is continuing at an annual rate of 50,000 *rai*.

There have been two major factors contributing to the deforestation in Nan, these are the conversion of forestland to agricultural land, and the effects of logging. Commercial logging concessions in Nan were first granted in 1973, and logging continued until the 1989 national logging ban. Around the same time as the logging concessions were first being granted, commercial crops were being introduced in agriculture. Logging greatly aided the expansion of these crops because land that had been logged was then burned in order to clear it and prepare it for planting. Thus, even more deforestation occurred as a result of forest areas being cleared to use as cropland.

The rapid deforestation in Nan prompted the RFD to set up the Upper NAN Watershed Management Project. In 1996, this Project received support for capacity development in environment management from the Government of Denmark, through DANCED. The project comprises six Watershed Management Units and 45 villages of different ethnic groups including, Muang, Hmong, and H'tin. The key to the rehabilitation process in the Nan Watershed is the use of participatory land use planning (PLP) at the micro-watershed level, as well as, the provision of supplemental revolving funds for irrigated paddy crops and agro-forestry. PLP has been so effective that it is now considered to be the "traditional" watershed management process in Thailand (Ewers, 1998).

The catchment area in the region has been reduced significantly by fires (often started by the farmers themselves), droughts in the dry season, and erosion and flooding in the rainy season. Due to these, indispensable watershed areas, timber reserves, food sources (wild game and plants), as well as an inestimable amount of biodiversity have all been lost. The use of advanced agricultural

systems (high-yield varieties of chemical fertilizers and pesticides) have further leached nutrients from the soil, increased pollution, and have burdened many farmers with debt because of the higher production costs involved.

Before the inception of the Project, many local communities had their own social rules for the use of resources (Box 3). The Huk Muang Nan movement has also helped to strengthen community regulations, establish maps for village boundaries, and assist in training communities to use the participatory planning processes. For the Huk Muang Nan movement, the village regulations that coincide with RFD objectives include:

- those who cultivate in head water forests will be fined 2,000 baht per *rai*,
- those who burn fields and allow fires to spread into neighboring forests will be fined 1,000 baht,
- those who want to burn their upland fields must first establish a firebreak and inform the village committee five days before the burning, otherwise a fine of 1,000 baht will be enforced.

Of the aforementioned three conditions, the second condition is particularly prominent in 30 villages within the project area. Penalties and fines imposed by the village on violators can be heavier than those stipulated in forest laws. For example, a fine for fire damage to the Ma Kwaen trees (*Zanthoxylum limonella*), which is a high cash yielding wild specie, can be as high as 5,000 baht per mature tree (Hoare et al., 1997, cited in Hoare 1999).

The co-operation of the villages within the project has resulted in savings to government budgets for fire prevention. By 1998, 94 kilometers of firebreaks were established by villagers in the project area compared to 85 kilometers established by the RFD. The latter used a budget of 3,400 baht per kilometer. The village volunteers received no payments, although food was provided by some Watershed Management Unit Chiefs (Hoare, 1999). In the upper Nan Watershed Management project, the project areas that caught fire in 1998 were substantially reduced compared to a year earlier. The percentage of project areas with fires in 1997 was five percent. In 1998, this percentage increased to 21 percent and in

1999, with co-operation from local communities, the project areas with fires was one percent. However, the Nan watershed chief cautioned that the figures should be interpreted with care. The year 1997 was an extremely dry year because of El Nino. The fires in 1998 had also helped to reduce litter levels, which could have cumulated as potential fuels in 1999. However, while wetter weather and other conditions were contributing factors, the villagers' participation was definitely a contributing factor as well.

In regards to other environmental activities, the community regulations have broadened to include the prohibition of destructive fishing methods, such as the use of explosives and cyanides. Some villages have also started fish sanctuaries.

In the sub-district of Saeng Thong, community rules were further strengthened through the formation of a network that is supported by the local government. The Sub-district Committee held revolving meetings with villagers from each village to discuss the 'network agreement' for the management of natural resources. Village boundaries serve as the demarcation for responsibilities and rights to the local resources, including fishes, animals, and other forest products. The villages that breach the network agreement will not receive their share of grants allocated through the sub-district organization (Ongkan Borihan Suan Tambon or known in short as Or Bor Tor) from the Central Government.

In the network agreement, fines tend to be lower because local government's fines must not exceed the rates stipulated under the forest and environmental laws. Therefore, fines hardly exceed 500 baht per activity. However, the enforced responsibilities and incentives at the local network levels can be made more stringent. Such is the case for firebreaks, in which it is stipulated that the width of the firebreak must be at least eight meters. Those who report fires and the culprits of fires to the village committee will receive half of the fine and the name of the reporter will not be disclosed.

In this last case, competition for resources, especially threats of competition for natural resources and negative environmental impacts from outsiders, have been catalysts for establishing village networks, and institutionalizing and enforcing network agreements.

The network is also re-enforced by the 1994 Tambon Council and Tambon Administration Organization (Or Bor Tor) Act, which empowers local governments at the sub-district level to manage the local natural resources and environment. Unlike most other local governments, which concentrate their efforts on building infrastructure, the Saeng Thong Sub-district Committee provides funds for conservation purposes.

## 6. CONCLUSIONS

This paper traces watershed management in Thailand from the policy to the field level. It is evident that watershed management in Thailand is equivalent to forest protection. Fire protection and suppression, as well as, reforestation are the major activities of the Watershed Management Unit of the Royal Forest Department.

To date, Thailand's National Forest Policy has not recognized the importance of the role of public participation in the management of forest resources, even though a community forest law is in the making. At the operational level, a number of Watershed Management Units have experimented with ways to cooperate and work with the traditional communities in the forests. Furthermore, limited participation of the communities is encouraged in the "participatory land use planning" approach, from which, the outcome eventually becomes a tacit agreement between the Watershed Management Unit and the local communities for land and forest use arrangements. In return, the communities have access to land security, better infrastructure, and health and education facilities.

The remaining obstacles to a participatory approach to natural resource management in Thailand are immense. The land use plan devised and agreed to between Project officials and the communities are only gentlemen's agreements and are not recognized by law, nor is PLP or its outcome, which is the adopted management model in all Watershed Management Units. PLP is often practiced in foreign funded projects, not because of financial reasons, but because it is an attractive selling point to foreign donors. Until the principles of PLP are officially adopted and the performance of the RFD officials is performance based, it is unlikely that the PLP will be sustained. Moreover, off-field and senior staff that

have no experience in working with communities, still cling to their outdated ideas and philosophies.

Constraints outside or above the RFD's domain of authority include: the facts that many hill-tribe farmers are not yet legal citizens of Thailand; the forest law does not recognize most highland communities, as they are often located in forest reserves and national parks or highland watersheds; there are not yet clear national policy directions from the government on how to treat communities in the forests; and finally, policies tend to swing according to whom and which party controls the Ministry of Agriculture and Co-operatives.

A legal basis is clearly needed to recognize the outcomes of PLP in order to guarantee a long-term sustainable land use patterns. It is also imperative that education opportunities and non-farm employment skills and alternatives be given to younger generations of farmers in the forests.

Unlike PLP, the village networks tend to be more sustainable and are maintained even after the foreign funding has expired. As population continues to increase, villages' boundaries grow closer and the offsite or trans-boundary impacts have become more frequent. Watershed networks are needed to provide a forum for negotiation and rules for good citizenship, as well as, to define the boundaries for responsibilities. In other words, repeated experiences that non-co-operation may lead to a worse situation (the tit-for-tat game) has actually fostered and maintained the watershed network in order to reduce inter-village externalities. A network of villages respecting the same rules for natural resource management serves as a forum for equals to guard their own interests and to resolve inter-village environmental conflicts arising from unmanaged fires, water pollution, and trans-boundary hunting. To some ethnic minorities, the network also provides security in the form of both, solidarity and the feeling of being part of the existing establishment.

In the course of a transition from swidden to 'modern' sedentary agriculture, communities have also broadened ecosystem management objectives from the traditional and singular goal of forest protection to objectives that include soil and water, as well as, fisheries and wildlife conservation. A revealing conclusion from the

two case studies is the role of commercial trees as an incentive for farmers to participate in fire prevention. To protect their own commercial trees, the farmers need also to protect the surrounding forests from fires. The findings of the case studies, thus, suggest the importance of agro-forestry in the watershed landscape. This could be a solution that might be replicated at a wider scale.

This study also indicates that the extent of people's participation in forest protection, such as in fire suppression, can be used as both input and output indicators of the successes of the watershed protection units. People's participation increases both the output of the project, measured in terms of the lengths of firebreaks contributed by the villagers, or as input indicators such as, the number of villagers involved, the acceptance of village networks, and the reduction in costs of fire prevention.

One recommendation from the case studies is that the RFD could consider devolving forest fire suppression to local communities once the incentive system is in place and thus, could devote itself to the pursuit of more scientific and knowledge intensive activities. It is time that the RFD built up its scientific capacity on the other ecological functions of forests. In the next millennium, the RFD will need to move, not only from extraction to conservation, but also will need to be more research than operation-oriented, as operations will be more and more devolved to the local governments.

To achieve forest protection objectives, "protect the forests for water" has been the slogan used not only by the RFD, but also by civil society movements and NGOs. It is now widely assumed in Thailand (without supporting research on the hydrological impacts of different types of forests and land uses) that the more forests there are, the more water there will be. Moreover, in order to save the forests, the RFD has introduced transplanted rice crops to augment food supply for the communities, despite the slogan and despite the fact that rice is one of the most water intense crops. In the longer term, it is important that the value of forests and the related ecological functions and services are properly understood. A nation can only make further progress based on science and not on the basis of perception.

<sup>1</sup> Swidden agriculture is a system of rotational agriculture where land is cultivated one year and is left fallow for a number of years to regain fertility. Fallow can take up to 9 or 10 years.



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