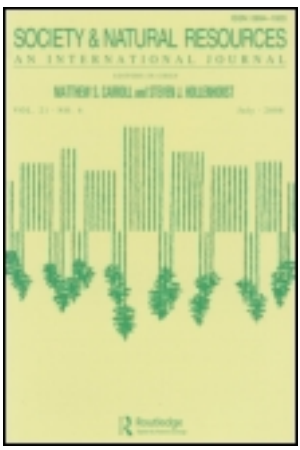

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Insights and Applications

Decision-Making Arrangements in Community-Based Watershed Management in Northern Thailand

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This article examines four case studies of community–based watershed management with emphasis on their operational decision–making arrangements. All the case studies established community–based regimes as a result of declining resource abundance, but differ in their operational rules, administration, effectiveness, and satisfaction among stakeholders. Even though legally the watersheds are state property, 73% of the villagers consider them communal property. Almost all villagers are aware of the community rules governing use, with 88% voluntarily accepting the rules and over 90% thinking that they are appropriate. Rule violation by members is seen as the greatest threat to continued existence in three of the communities. The communities are compared against seven design principles associated with more robust institutional characteristics for common property resources. In general, as anticipated, smaller watersheds close to the communities with clearly demarcated boundaries and fewer users and with high individual involvement in decision making are more robust.

Keywords community–based management, forests, local institutions, sustainability, Thailand, watershed

History reveals a constant process of central governments seeking to exert their authority over lands previously managed by more local levels of government. Such appropriation of local resources was mainly undertaken as a means to realize the resource values of those lands for the central treasury. Recently, global and national attention has been increasingly focused upon the environmental degradation that has, in part, been facilitated by such government control and exploration of resources. Global deforestation and pollution are of such a scale as to influence

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climatic patterns. Rates of species extinction are the highest for at least the last 65 million years. (Groombridge 1993). These problems have focused global attention on the need to protect natural habitat in some areas and forego the extractive resource values that could have been derived. As a result, many countries throughout the world have established some form of protected area system, where state control is exerted over an area for the specific purpose of conservation.

Both of the situations just mentioned, resource extraction and protection, result in the appropriation of resource values from local to central levels of control. Such transference of authority is not, by definition, bad, nor is local control always preferable. There are many valid cases in society where a larger spatial and societal perspective is required to help make equitable and just decisions and recognize intergenerational obligations. Without such considerations, the interests of a single individual may be able to forstall construction of state infrastructure– a hospital, airport, or freeway, for example– that may stand to benefit many more individuals in society. However, where local people are displaced for conservation reasons, it may be because of their own careful resource management practices in the past that conservation values are sufficiently high to warrant protected status designation. In response to alienation from this traditional resource base, whether by physical relocation of communities or through central government law enforcement, villagers may engage in environmentally destructive practices that they would not have engaged in previously. As local users and managers, they had an interest in maintaining the sustainability of the resource; as illegal users, this is no longer the case. What historically was treated carefully as a community–managed resource may now degenerate to a virtually uncontrolled common access resource (e.g, see Faichampa 1990; Santasombat 1995). Such is the fate of many protected areas such as national parks that have been designated on what were previously village lands. As a result, not only does the village lose the rights to community management, but also the state may find itself unable to protect the conservation values from further deterioration.

One alternative to this scenario that might be appropriate in some situations is to allow communities to manage local environments in a sustainable manner, for example, as community–based watersheds where the village members collectively manage the local resource base for the ongoing benefits of its members. Unlike more monolithic state structures, there is a great range of possible arrangements that might be used by villagers to effect such management at the operational level. Not all arrangements might be equally effective. This study was undertaken to examine three main questions with respect to the way in which community–based watersheds are managed in northern Thailand:

1. What are the different operational rules for resource management in different communities?
2. What is the perception of these rules by the villagers themselves?
3. Why are some village–based arrangements apparently more effective than others?

In terms of the last question posed, several studies have been undertaken that suggest relationships between factors such as village size, numbers of resource users, scarcity of resources, and mode of village decision making and the effectiveness of the resource management regime (e.g., Esman and Uphoff 1984; Wada 1988). Ostrom (1990) has also outlined seven design principles that seem to characterize more robust common property resource institutions. These factors are used later, to assess the case study villages. Before discussing these in more detail, however, attention is devoted first toward the broader historical and institutional context.

Historical and Institutional Context in Thailand

The situation just described, of progressive alienation of the land base from local to central authorities, has happened in Thailand (see Pragtong and Thomas 1990). Over 100 years ago, the profits that could be realized from logging teak in the north led to disputes between local feudal chiefs and the British concessionaires. As a result, the King seized control of the forests and established a government agency to grant concessions and collect fees. Since that time, the forests in Thailand have been under state control, administered by the Royal Forestry Department. During this time, the forest cover in Thailand has declined rapidly, with many experts feeling that the amount of natural forest remaining is less than 20% of the land area, under half what it was 25 years ago (Hirsch 1987; Hurst 1990). Food and Agriculture Organization (FAO) figures suggest that between 1981 and 1990 the average rate of deforestation in Thailand was 5.2%, the highest in Asia (*The Economist*, 25 June 1994). Alarm over this situation, and the death of over 300 villagers in a logging–related landslide, finally caused the government to officially ban logging in 1990. Since that time, all wood–cutting concessions (with important exceptions in mangrove forests) have been canceled, although illegal logging is rampant.

The government also moved to protect some of the remaining forests through the establishment of protected areas. The first national park, Khao Yai, was gazetted in 1962 under the National Parks Act with the explicit goals of protecting lands in their "natural state for the benefit of public education and enjoyment." Wildlife sanctuaries had been previously defined in the Wild Animals Reservation and Protection Act of 1960 as areas set aside "for the conservation of wildlife habitat so that wildlife can freely breed and increase their populations in the natural environment." Nonhunting areas are the third main category of protected area in Thailand. They were originally established to protect the populations of certain listed species from hunting. However, in 1992 the law was revised to include protection of all animal species and vegetation.

As of March 1996, 63 terrestrial national parks covered some 22.8 million rai (3.65 million km^2), and 38 wildlife sanctuaries covered 18.2 million rai (2.9 million km^2), amounting to some 15% of the total land area. There are also 48 nonhunting areas for which areal coverage is not available. Current plans call for the establishment of 42 new national parks to cover a further 14.4 million rai (2.3 million km^2) and as many as 31 new wildlife sanctuaries covering almost 6 million rai (0.96 million km^2). Twenty–four of these new national parks are planned for the north and will cover an area of some 9.4 million rai (1.5 million km^2). Within wildlife sanctuaries and national parks, regulations governing use are strict. For example, in national parks it is forbidden to hold private land; clear, burn, or otherwise destroy the forest; remove any wildlife or plants or endanger any plants or animals in any way; change the course of waterways; allow cattle or other livestock to enter the park; carry on any activity for economic gain without permission; introduce any hunting or trapping gear; or fire any gun or firework. Violations of these regulations are massive (Elliott and Beaver 1993; Griffin 1994; Dearden et al. 1996; Tanakanjana 1996; Dearden and Chettamart 1997), and biodiversity values have been significantly eroded in Thailand over the last couple of decades (Science Society of Thailand 1991; MIDAS 1993; Office of Environmental Policy and Planning 1995; McNeely and Somchevita 1996).

Thus in Thailand as a whole, and particularly in the north, local villagers have been alienated from their resources base, first as a result of concessions for timber

extraction, and second as the government has increasingly recognized the need for habitat protection and established state protected areas, largely national parks and wildlife sanctuaries. Besides these state initiatives, a large number of community–based watershed management arrangements have also arisen in response to resource scarcities (Faichampa 1990; Roddan 1996). However, there has been little analysis of the workings and efficacy of these local institutions.

Ostrom (1990) has suggested that institutional analysis of common property regimes can be facilitated by recognizing three levels of decision making. At the macro level are the "constitutional–choice" rules that ostensibly provide the legal framework for decision making. They define property rights, assign authority, and define the rights and duties of the people. Lynch and Talbott (1995) have provided an overview of such constitutional–choice rules in relationship to community–based forest management in the Asia–Pacific region, including Thailand. Further details are provided on the Thai context by Bhumibhamon (1986), the Thailand Development Research Institute (1987), and Pragtong and Thomas (1990). An important addition to this framework is the current move to promulgate a new Community Forest Act. However, it is important to note that at the moment, all the case study villages are formally within lands administered under acts that do not allow for community–based management.

At the intermediate level are the "collective–choice" rules used by officials or external agencies to decide how specific watersheds should be managed and by whom. Banijbatana (1970), Hoare (1986), and Dearden (1996) provide some idea of the complexity of this situation in northern Thailand. There are many different policies and plans, even within the same agency. Major emphasis has been placed on controlling the activities of the opium–growing hill tribes, with relatively little attention paid to the subsistence farmers of the upland watersheds, the focus of this study. Another important policy framework is provided by the watershed classification system enacted by Cabinet Resolution in 1985 that, on the basis of biophysical characteristics, sought to classify the highland landscapes into five classes that indicated progressively greater restrictions on occupancy. This resolution set an important umbrella policy for agencies working in watershed areas, but was found to be technically and practically flawed in several aspects (e.g., see Hastings and Boonraksa 1990).

It is the third level of decision making, the "operational" rules, that have most direct effect on the coappropriators and the way in which they withdraw resource units. In comparison to the other levels, they have received relatively little attention by scholars (see examples in Santasombat 1995; Roddan 1996). These rules are devised by the local communities themselves and establish monitoring procedures and penalties for infractions. Such rules vary from community to community, and the description and analysis of these rules provide a main focus for this article in the next section.

The Case Studies

Geography

Northern Thailand is an area of steep, north–south–running mountain ranges up to 2500 m in altitude, separated by often fairly broad alluvial valleys (Figure 1). Three land–use zones may be recognized in relationship to this topography (Uhlig 1980). The first zone, in the valleys, is dominated by sedentary, wet–rice farmers. The second zone, of intermediate elevation, often shows a mix of wet–rice cultivation

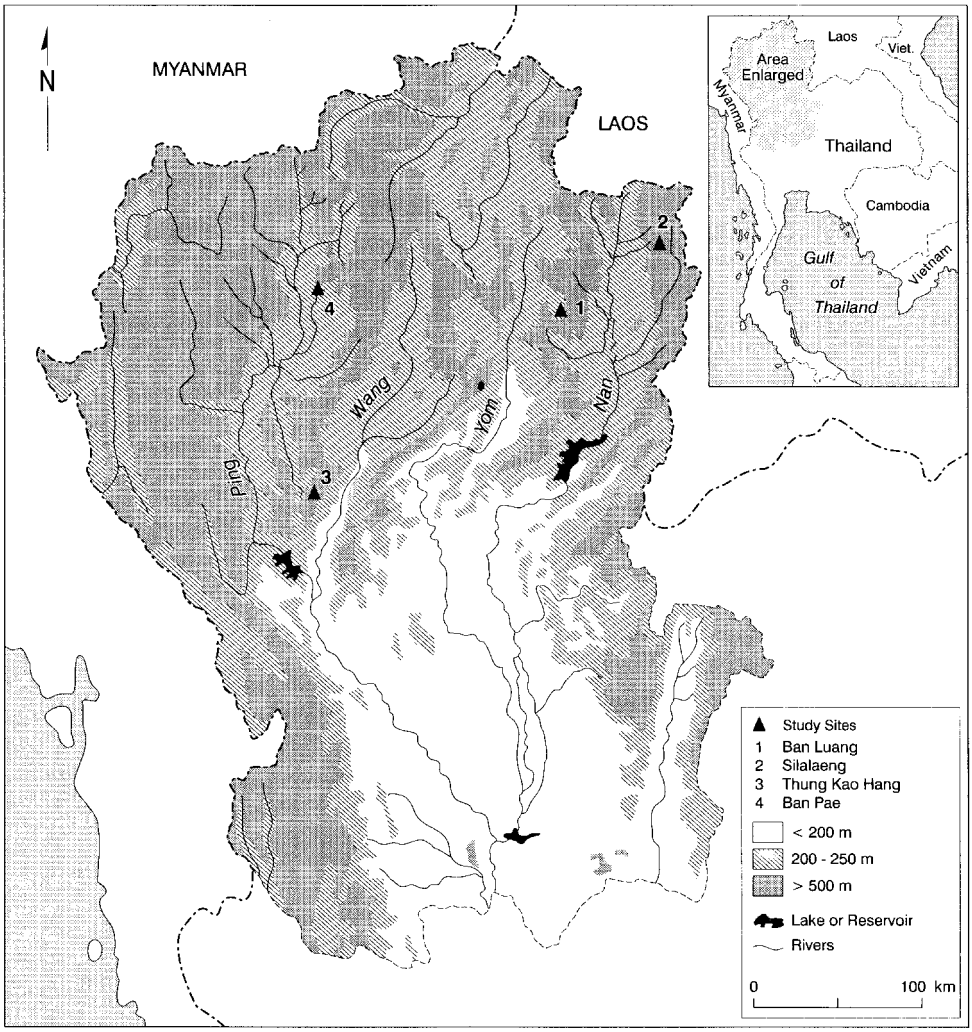

FIGURE 1 Locations of case study villages in northern Thailand.

using terraces and dry rice cultivation. Some natural vegetation may remain, and populations are composed both of ethnic northern Thais and some hill–tribe groups, particularly the Karen. At the highest elevations are the hill tribes that have traditionally used shifting agriculture. Originally growing opium as part of their crops, these groups have come under increasing pressure to adopt a more sedentary mode of agriculture using other cash crops, such as cabbages, coffee, and tea (Cooper 1984; Dearden 1995; Robert and Renard 1989). Most are now sedentary. Conflict often occurs between these groups at higher elevations and their land–use practices (e.g., see Tan–Kim–Yong et al. 1988, Tungittiplakorn 1995) and the other groups lower down the watershed. In some cases these conflicts have been instrumental in the formation of community–based watershed management in the lowland communities. The case studies presented here are all wet–rice–growing communities in the lowland zone, with some agricultural activities in the second zone and the community watersheds in the third zone.

Community Selection

Of the 146 recorded community forests established in the north (Social Research Institute 1991), not all have been formed for resource conservation purposes (e.g., some are for religious reasons). In selecting which communities to study in more detail, four main criteria were used: the size of the watershed forest, the number of resource users, the scarcity of watershed resources, and the level of decision making. These criteria were used as a result of suggestions from the literature (e.g., Wade 1986; Ostrom 1990) that small size, a small number of resource users, a moderate scarcity of watershed resources, and village-level decision making are likely to result in more robust common property resource management situations. A robust institution is one that is resilient and likely to persist over time.

From the original database, it was found that only 60 of the community forests were actually managed as watersheds. Further screening of these communities in accord with the criteria just described resulted in a dozen communities that were visited before four communities were selected for further study as being good representatives of the different criteria. The number of users and size of each watershed are shown in Table 1, along with other pertinent geographical facts. Relative resource scarcity reflects the subjective opinions of the villagers and the field experiences of the researchers, which were rarely at variance. Information on each community was collected at both the community and household levels. Descriptions of these communities follow in more detail in the next section.

Information was collected by a researcher and assistant from the region, both fully familiar with the local dialect, over a 6-month period in 1992. Qualitative methods included interviews, participant observation, informal discussions, and reviewing historical records. Principal informants included community leaders, members of decision-making committees, village elders, and local officials. Full socioeconomic surveys at the household and village level were also undertaken involving structured interviews with heads of households. In total, 306 households were interviewed in this manner, 7% of the total number (4,229), on topics ranging

TABLE 1 Summary of Prominent Characteristics of the Four Selected Communities

Characteristics	Ban Luang	Silalaeng	Thung Kao Hang	Ban Pae
Watershed forest (ha)	25,365	9700	320	71.36
Number of users:				
People	11,459	6291	604	264
Households	2755	1231	157	86
Villages	25	10	1	1
Proximity of villages to watershed (km)	5–6	1–2	3	0.5
Relative resource scarcity	Mild	Moderate	High	Very high

from socioeconomic status through to willingness to violate community regulations. The researchers lived in the villages during this period of data collection and took part in many aspects of village life, including watershed monitoring. The resulting data is a rich mix of qualitative and quantitative information. The latter was analyzed using simple descriptive statistics from SPSS.

Operational Rules of Governance

The operational rules are a critical aspect of community–based watershed management, as they determine what practices are acceptable to the community of stakeholders for the management of their jointly held resource. They also differ considerably between communities in terms of their scope, specificity, and enforcement. This section provides a brief historical/geographical overview and examines the rules and organization within each community before looking at the perceptions of the rules by the respondents.

Rules and Organization

Ban Luang

Ban Luang is the name of a group of four tambons (subdistricts) in the province of Nan (Figure 1). Livelihood is dependent mainly upon wet–rice production, with important supplementary income from rainfed cultivation and livestock. Community–based watershed management began in 1974 when a sawmill company from Nan city sent loggers to cut trees along the road connecting the community to Nan. Logging then proceeded into the watershed areas that had been protected by the villagers for generations as a water supply. Although the villagers complained to the authorities, nothing was done, as the company had a legal logging permit from the government. In 1974 villagers seized logging equipment and demanded cessation of logging. After a standoff the company agreed and some 3600 logs cut by the company have been left to return their nutrients to the forest ever since. At the time of this conflict, there was considerable unease over the threat of communist insurgency in the area. It was feared that if the company and government did not capitulate, then further hostilities might be created. Since this time, Ban Luang has been operated as a community–based watershed through agreement between local leaders. There are no hill tribes in the watershed. The last village that tried to locate there was burned down by the villagers, along with all the crops.

The operational rules in Ban Luang were first established in 1975 by consensus of the farmers' groups following the blockade of the logging concession (Table 2). Given the origin of the agreement, it is not surprising that there is an emphasis on forest protection from the activities of outsiders. This does not, however, extend to the activities of villagers who wish to cut trees to build houses, as long as they gain prior approval from the headman. In this activity they are often assisted by fellow villagers, who not only provide labor on a reciprocal basis, but will also help with negotiations with forestry officials if the party is apprehended. Interviews revealed that forestry officials are somewhat skeptical of these activities, seeing them as violation of state laws to further the self–interest of the villagers. The villagers also illegally retained possession of over 100 chainsaws that were obtained during the logging blockade. The government has now moved to make chainsaw possession legal, as long as the saw is licensed with the local authorities.

The highest decision–making body is the 25–member convention of all the village headmen and tambon leaders. In reality this is rarely the case, as each

TABLE 2 Operational Rules for Ban Luang

1. Villagers who want to cut trees for house building have to ask permission from the Tambon Council. After approval from the Tambon Council they have to request permission from the RFD official at the district office. Then they can go to the forest to cut the trees.
2. Every member of the community has the responsibility to help monitor for forest intrusion from outsiders and report the incident to the village headman or Khamnan immediately.
3. Hill tribes are not allowed to clear the forest for shifting cultivation in Ban Luang territory.
4. Any logging concession in the forest of Ban Luang has to seek approval from the Tambon Council.
5. The Tambon Council in turn has to get at least 80% of the members of community to agree with such a concession.
6. The villages are not allow to accept any kind of bribery from the logging company.

Note. Translation from original document held by Khamnan Pan Inlee, the former leader of the farmer group and former Khamnan of Tambon Suad.

tambon is delegated to handle its own watershed area, within the general guidelines of the rules already mentioned. There is little cooperation between tambons in decision making, and some are routinely accused of encouraging a more lax interpretation of the rules than desirable. In fact, one tambon has established a checkpoint to prevent timber smuggling out of its watershed during the night. The leaders of one of the other tambons are suspected to be involved in this illegal timber trading.

These double standards for enforcement of the regulations may well precipitate the disintegration of the Ban Luang community watershed. This is, in part, due to the large size of the watershed (Table 1), and the situation is similar to that described by Shui Yan Tang (1991) where problems arise due to a uniform set of rules being applied to a large common-pool resource regardless of the specific circumstances. In fact, originally in Ban Luang, the rules were organized along watershed lines by the well-established water-user groups (*Muang Fai*) rather than on the political administrative units that they are now. A return to this system may well be warranted.

Silalaeng

Silalaeng is also in Nan province (Figure 1). The population is supported mainly by wet-rice agriculture with the water supply dependent upon the forested headwaters, which are over 1000 m in height. Most of the population are northern Thai, but there are also 3 villages of hill-tribe peoples that were relocated to the area during 1967–1970 to escape fighting between government forces and communists. Community-based watershed management evolved under the guidance of a charismatic leader during 1967–1977, due to increasing concerns over diminishing forests and increased periods of drought. In 1979 a local regulation was promulgated banning shifting cultivation in the headwaters. This was aimed at the H'tin communities in the area that practice a system of shifting cultivation similar to that of the Karen and Lua (Kunstadter 1978). In 1982 the Tambon containing the H'tin communities was split from Silalaeng, and the relationship between the tambons is sometimes one of conflict.

The operational rules for Silalaeng are also written down (Table 3). They are much more specific than those of Ban Luang and are institutionalized into the routine activities of the community. The rules clearly state the rights and duties of the members of the community as well as the authority and liability of the Tambon Council as the decision–making body. The Tambon Council is comprised of the tambon leader as Chairman, every village headman in Tambon Silalaeng, a highly respected elder elected for a 5–year term from each village, the tambon doctor, a secretary selected from the elementary school teachers, and an adviser appointed by the district officer from either the deputy district officer or community development officer. Unlike Ban Luang, this structure makes for stronger unity in decision making, and the watershed activities fit within the overall regular program of the Tambon Council. Regular monitoring patrols are a distinctive feature of Silalaeng.

TABLE 3 Selected Operational Rules for Silalaeng (Translated From the Thai Original)

1. The Tambon Council as an administrative community is responsible for forest protection.
2. Each village headman has to submit three persons from his village to be the monitors in the Forest Patrol Committee and is responsible for any change in these representatives.
3. The Forest Patrol Committee is on duty twice a month or more.
4. In the case of loss of life while on duty, the Tambon Council will compensate the family with the amount of 10,000 baht. In the Tambon Council meeting session 11/2532, the amount of money was changed to "1,000 baht from each village."
5. Should any village not cooperate and not comply with this regulation (concerning forest patrol), the possible penalties are as follows: warning and more contributions next time, fine for 100 baht/person/day, forfeit the rights to use the forest.
6. The Chairman of the Tambon Council (Khamnan) has the duty to coordinate with other Tambon, with the Forest Patrol Committee, and with the government officials involved in forest protection.
7. Every member of the community has the right to request for appropriation of the forest for building a house. The villagers may make a request through the village headman, who will bring it up for approval at the meeting of the Tambon Council.
8. Request for appropriation of the forest for house building is limited to only three logs for one village a month.
9. Penalties for violating the regulation of forest appropriation are as follows: be fined 1,500 baht for each tree cut, or failure to comply with the fine, the Tambon Council will take legal action (illegal logging).
10. Villagers who give information about the violation of rules that leads to seizure of logs will be awarded half of the value of the confiscated property.
11. Villagers allowed to cut trees must replant five trees for every one tree cut.
12. Villagers who want to collect fuelwood and make charcoal have to seek approval from the Tambon Council.
13. One third of the revenue from the fines goes to the Tambon Council for public spending and the rest is awarded to the Forest Patrol Committee.

Duties circulate among the villagers. When on patrol, monitors get paid and are also covered by insurance for injury or loss of life. The resource protection element of the watershed management rules is clearly more stringent than in Ban Luang.

Thung Kao Hang

Thung Kao Hang is a village in Lamphun province (Figure 1), in the upper part of the Li watershed, an important source of water for the fertile rice growing areas downstream. Thung Kao Hang, however, is situated on only a small tributary to the main river, and water supply is a constant problem in an area that receives one of the lowest amounts of rainfall in the north. Paddy rice is grown by the villagers in the rainy season, with heavy dependence on the forest at other times. Efforts to exert more control over local resources began only after the richly forested areas around the village had been mostly destroyed by logging and shifting cultivators and the villagers began to experience acute water shortages. The Village Committee, led by the headman, thus created rules to prevent further destructive activities, with the unanimous consent of the villagers.

Thung Kao Hang does not have separate operational rules to govern watershed use. Instead, watershed regulations are contained within the regular village laws traditionally established by isolated rural villages to cover a wide variety of potential misdemeanors, such as vandalism, theft, firearm violations, and similar activities. The village laws are posted on a large board within the village where everyone can see it. However, the laws are common knowledge since they were established through village consensus. The two laws relating to forest use remind the villagers that all kinds of trees in the watershed forest are protected, and that violaters will be fined and sent to officials for legal action. Decision making is through the Village Committee. The village is divided into 12 groups of 12–13 households, of which each group selects a representative to the Village Committee.

Ban Pae

Ban Pae is a small wet-rice-growing village on the outskirts of the fast-growing district of San Khampaeng, Chiang Mai province, and is only some 25 km from Chiang Mai itself and 15 km from Bo Sang, one of the most prosperous tourist villages in the north (Figure 1). Many of the Ban Pae villagers now commute daily to this village to work. The village is on a gentle slope, to the west of the community forest, which contains valuable teak trees (*Tectona grandis*). Since the time of inception of the village in 1933, the villagers have paid homage to the spirit that caused springs to flow in the area. Originally there were three, but now two have dried up– attributed by the villagers to forest clearing in the area. Every August, the villagers hold a ceremony to pay tribute to the spirit of the headwaters. They have also built a canal from the spring to irrigate their paddy fields and also provide water for domestic use. The village has now become very well known as a symbol of community-based watershed management.

Unlike the other three cases, there are no written laws or guidelines. It is assumed that all households are sufficiently familiar with the operational rules as to make such formal notification redundant. Table 4 shows a summary of these unwritten rules as compiled by the researchers from interviews. There are strong kinship ties within the village, with the same families since initiation of the settlement. These close relationships have established norms and traditions of community control that obviate the need for formal expression of those regulations. The Village

TABLE 4 Operational Rules for Ban Pae

1. Watershed forest is protected entirely to sustain water yields. Any kind of tree cutting is strictly prohibited.
2. Ones who violate the rules (cutting the trees) will be fined at the rate of 100 baht for every inch of the length of the confiscated wood.
3. If the violators do not comply with the fine penalty, they will be sent to the police.
4. All villagers are responsible for monitoring any kind of wrong doing in the watershed forest. Anyone who gives information which leads to the arrest of the violators will be rewarded 200 baht per case.
5. Revenue from the fines and fuelwood auctions are kept by the chairman of the Village Committee for public spending in the village. Spending must be approved by the Village Committee.
6. The Village Committee is the organization responsible for rule enforcement and decision making.
7. Each member of the Village Committee is responsible for coordination of 10 households to provide a two–man shift for foot patrol at night.
8. Extraction of fuelwood from the watershed forest is allowed by auction only.

Committee, comprised of the headman, his deputies, and 5–9 elders elected to 5–year terms, is charged with enforcing all village regulations.

Thus, in all cases, the communities tend to use existing decision–making structures to administer their community watersheds. Although water–user groups may have been important catalysts, activities have usually been shifted to local administrative bodies, such as the tambon council or village committee. Ban Luang is an exception to this rule where the convention of tambon leaders and headmen was established to oversee the watershed regulations. In effect, however, operations are still controlled by the tambon councils. One advantage to using such existing structures is that they are already recognized as part of the governing body by higher levels of government and thus are seen as less threatening and may also be eligible for rural development funds.

Perceptions of Operational Rules

The perceptions of the rules by the villagers can be as important as, or even more important than, the actual specification and enforcement of the rules in determining the efficacy of the management activities. Most respondents (72.9%) consider the watersheds as community property resources in which all members of the community share equal rights and duties, rather than the legally correct answer of state property (Table 5). Interestingly, there is a significant difference between the villages in terms of these perceptions ($\chi^2 = 33.42$, $p < .001$), with Ban Pae having the highest perception of a common property rights regime, and Ban Luang the lowest. This is suggestive of the findings of Ostrom (1992) and Feeny (1992) that villagers in a small community with a small watershed area in close proximity to the village (see Table 1) are likely to develop strong collective actions with regard to local resource use.

Almost all households (average 98%) knew about the existence of the watershed operational use rules. A few households, particularly in more remote areas of Ban Luang, were somewhat sketchy on the details and mechanisms of the rules and

TABLE 5 Perceptions About Property Regimes of Watershed Forest in Each Community

Perception	Ban Luang	Silalaeng	Thung Kao Hang	Ban Pae	Average
Common property	55.7	79.1	77.3	93.8	72.9
State property	39.6	20.9	22.7	6.2	25.5
Open access	4.7	–	–	–	1.6
Total	100.0	100.0	100.0	100.0	100.0

perceived the rules as yet another outside form of regulation of their activities. Again, this is symptomatic of the difficulties involved with having such a large commons resource shared by so many people. In the other communities, the regulations were much more entrenched as an intrinsic way of life of the people. Interesting differences can also be seen in the response of people to the rules (Table 6). Overall, 88% voluntarily accepted the rules, with agreement being highest in the smallest watershed, Ban Pae, and lowest in the largest, Ban Luang. Those most likely to object in all the communities were found to be at the lowest socioeconomic strata, such as landless farmers who had the most heavy dependency on forest products. At the other end of the scale there are also small numbers of richer villagers who had been involved in timber trading. Both of these cases can be seen in Silalaeng, where the Tambon Council campaigned successfully to stop poor villagers from undertaking slash–and–burn agriculture in the watershed and to stop illegal timber trading.

Discussion

Ostrom (1990) outlined seven design principles that seem to characterize more robust common property resource institutions and that can be used to compare the four case studies discussed in this paper.

1. *Clearly defined boundaries*. It is critical to have a clearly delimited spatial boundary of the resource under consideration, in this case the community watersheds, and to be abe to clearly distinguish eligible from ineligible users. If this condition is not met, then the common–property regime can quickly deteriorate into one of open access. In Ban Luang the boundaries of the community watershed are congruent with the topographic delimitation of the watershed. However, due to the large size of the area, this may not be obvious to outsiders. Again, due to the size, there are also difficulties in identifying eligible users, due to the sheer numbers involved, as all residents are eligible users.

TABLE 6 Percentage of Respondents Accepting the Rules in Each Community

Acceptance	Ban Luang	Silalaeng	Thung Kao Hang	Ban Pae	Average
Reluctantly	17.0	11.6	9.1	4.2	11.8
Voluntarily	83.0	88.4	90.9	95.8	88.2
Total	100.0	100.0	100.0	100.0	100.0

In Silalaeng, the topographic demarcation of the community forest is not as pronounced as Ban Luang. However, this is compensated for by the villagers marking the boundary with concrete poles. All households in the tambon have the right to use the area, and most are quite familiar with it and each other, due to their communal monitoring activities. Furthermore, the watershed is close to the community, and all roads into the watershed must pass through the community and can hence be easily monitored. With Thung Kao Hang and Ban Pae the boundaries of the community forest are also topographic and clear to local villagers, but somewhat less clear to outsiders. In Ban Pae, the watershed forest is easier to distinguish from the surrounding forest due to the size of the trees to be found there, in contrast to the scrub growth outside. Were it necessary the small size of the Ban Pae watershed would permit continuous demarcation through the erection of a fence, as has been tried elsewhere in northern Thailand (see Tungittiplakorn 1995). The villagers also mark the boundary through the clearing of a fire break in the dry season. In both Ban Pae and Thung Kao Hang all households are accorded membership.

2. *Congruence between appropriation provision rules and local conditions*. Operational rules should reflect the physical and technical attributes of the common-property resource and the characteristics of the users. In the case studies discussed here, this is generally the case. Ban Luang, with its large watershed, does not impose strict limitations on appropriation of forest use for household subsistence because its forest condition is still relatively healthy. Silalaeng controls the rate of appropriation by the quota of trees that can be cut per month for each village and allows only fallen trees to be used as firewood. In Thung Kao Hang the watershed is totally closed to appropriation to allow replenishment to take place. Timber extraction is forbidden from Ban Pae for the same reason. When questioned, over 90% of respondents in total felt that there was congruency between the attributes of the watershed and the operational rules (Table 7). The main problem in Ban Luang, the community with the highest level of disagreement, related to the perception of unequal enforcement that was allowing overexploitation of some areas. Thung Kao Hang, which has the highest rate of agreement, even restricted bamboo cutting due to concerns over the sustainability of the resource.

3. *Collective-choice arrangements*. The decision-making arena provides an opportunity for individuals to participate in modifying the operational rules. This should lead to a constant adjustment of the rules as individuals interact with the resource and each other. Perception of how open the decision-making apparatus is to the community and actual levels of involvement in decision making can also have a significant influence on the strength of watershed management. Participation differed significantly between communities ($\chi^2 = 50.47$, $p < .001$, Table 8), again largely related to the size of the community. In a large community such as Ban Luang,

TABLE 7 Percentage of Respondents Agreeing That There is Congruency Between the Operational Rules and the Local Conditions, by Community

Congruent rules	Ban Luang	Silalaeng	Thung Kao Hang	Ban Pae	Average
No	15.1	7.0	4.5	6.2	9.2
Yes	84.9	93.9	95.5	93.8	90.8
Total	100.0	100.0	100.0	100.0	100.0

TABLE 8 Percentage of Households Taking Part in the Decision–Making Processes and Formal Monitoring

Participation	Ban Luang	Silalaeng	Thung Kao Hang	Ban Pae	Average
Decision making					
No	74.5	72.1	36.4	27.1	58.2
Yes	25.5	27.9	63.6	72.9	41.8
Monitoring					
No	72.6	51.2	97.9	77.1	70.6
Yes	27.4	48.8	2.1	22.9	29.4

decision–making procedures are the responsibilities of community leaders, and most people do not take part. The decisions are remote, lines of communication are not always good, and enthusiasm for community–based management is somewhat tempered. In Silalaeng, due to the size of the community, direct participation is only slightly higher, with rule–making tasks left to the Tambon Council. However, the villagers in Silalaeng seem happier about their abilities to have inputs to decisions through their representatives. In addition, villagers also have the opportunity to participate in the Forest Patrol Committee, where responsibilities rotate among the community. In both the smaller communities, Thung Kao Hang and Ban Pae, there are more opportunities for direct participation. Important issues about the watershed forest are usually brought up in village meetings to let villagers express their opinions.

4. *Monitoring*. In most cases all co–users are expected to monitor the conditions of the common property resource and the behavior of other users. In theory, in all the communities, the members are all responsible for monitoring. In practice, however, only at Silalaeng is monitoring undertaken on a regular basis (Table 8). Ban Pae used to operate a two–man patrol at night, but this has now been discontinued. Ban Luang launches occasional patrols when information is received about potentially nonconforming behaviors, such as timber extraction. Thung Kao Hang does not have any formal monitoring activity, but relies upon the informal and incidental activities of villagers in the watershed, such as cattle grazing.

5. *Graduated sanctions*. Sanctions or penalties against rule violators should be assessed on a graduated basis depending upon the seriousness of the offence. Thus, first–time offenders in desperate need of subsistence resources should get a more lenient penalty than repeat offenders involved in commercial extraction. In all the communities, such graduated sanctions are applied. Over time there has been a toughening of penalties to keep up with the increased rewards that might be brought by violation. There is increasing reliance on turning repeat violaters over to external authorities for punishment.

6. *Conflict–resolution mechanisms*. When user–community conflicts cannot be solved under the operational rules, then there should be access to higher level but low–cost alternatives. In all these communities, local leaders would, at one time, have been able to resolve conflicts. However, with increasing scarcity of resources there are more conflicts and more intense conflicts. As mentioned earlier, this has brought increased reliance on external authorities, often local government officials or the formal judicial system. There are, however, marked differences in opinion

between Ban Luang and the other communities about whether to use local officials for conflict resolution, or go directly to the law enforcement system (Table 9). The other communities favor the latter as a means to reduce the influence of the patronage system in the community, in which local officials are often involved.

7. *Minimal intervention in rights to organize*. This principle reflects the rights of the local people to organize to protect common resources without fear of retribution by the government. Respondents overwhelmingly indicated (average 98%, with no significant differences between communities) that they thought the government would acknowledge the de facto rights of the communities with regard to the watersheds.

In addition to these external design principles, it is also important to assess what the participants themselves feel are the most important threats to their watershed forests in the future (Table 10). Rule violation by community members is seen as the biggest threat in three of the communities. This is particularly worrying as cooperation between users is the very foundation of this form of institutional arrangement. In Ban Luang, a considerable number of respondents still feel that outside pressures constitute a threat, whereas the "authorities" are seen as bigger threats in Silalaeng and Ban Pae. In the latter case, this is probably due to the success of the community watershed, attracting accolades from outside, in which the Royal Forestry Department might not be reluctant to share and try to take over and claim some responsibility for the success. In the case of Silalaeng, fear of the authorities has probably still not dissipated since the conflict about whether the watershed should be included in the new national park or not. At Thung Kao Hang, leadership failure is the second most serious threat, following internal rule violation. Roddan (1996) also discusses a case where village leadership appears to provide

TABLE 9 Respondents' Preferences for Third–Party Resolutions, by Community

Third–party resolutions	Ban Luang	Silalaeng	Thung Kao Hang	Ban Pae	Average
Officials	41.5	3.5	–	–	15.3
Law enforcement	51.9	96.5	100.0	6.2	25.5
Others	6.6	–	–	–	2.3

TABLE 10 Perceived Potential Threats to the Institutional Sustainability of the Community Watersheds in Each Community

Potential threats	Ban Luang	Silalaeng	Thung Kao Hang	Ban Pae	Average
None	7.5	20.9	7.6	43.7	17.0
Rule violation	43.4	46.5	54.4	12.5	41.8
Outsiders	28.3	8.1	12.1	6.2	15.7
Authority	9.5	14.0	6.2	29.2	13.1
Leadership	10.4	9.3	19.7	4.2	11.1
Others	0.9	1.2	–	4.2	1.3
Total	100.0	100.0	100.0	100.0	100.0

TABLE 11 Summary of the Institutional Performance of Community–Based Watershed Management of the Four Communities

Design principles and overall assessment	Ban Luang	Silalaeng	Thung Kao Hang	Ban Pae
1. Clearly defined boundaries	No	Yes	No	Yes
2. Congruent rules	Yes	Yes	Yes	Yes
3. Collective-choice arenas	Yes	Yes	Yes	Yes
4. Monitoring	No	Yes	No	Yes
5. Graduate sanctions	Yes	Yes	Yes	Yes
6. Conflict–resolution mechanisms	Yes	Yes	Yes	Yes
7. Recognition of right to organize	Strong	Strong	Weak	Strong
Institutional performance	Fragile	Robust	Fragile	Robust

more of a threat than a benefit to a community forest, due to the potential conflict between the links of the village leader to timber interests and protection of the forest.

These design principles plus consideration of the perceptions of the threats to the watershed management regime by the villagers and the assessment of the researchers based upon their field experiences can be used to suggest overall institutional performance between the different communities (Table 11). Silalaeng and Ban Pae are seen as more "robust" communities because they substantially meet all the seven design principles, and the community members themselves are also confident about the future of their institutions. Ban Luang is assessed as "fragile," or susceptible to collapse, because its institutional performance lacks strength in enforcement and unity. Furthermore, its large size and number of users create confusion regarding membership and boundaries. In general, a large watershed some distance from the community with a large number of users contributes to a low degree of excludability. Thung Kao Hang is also assessed as "fragile" because of the lack of clear demarcation for its boundaries, and it has gained relatively little external recognition, making it more vulnerable to outsiders.

Conclusions

Each of the community–based watersheds discussed in this case study evolved as a result of different factors, although all reflect increasing pressures on a local resource that the national government, ostensibly the manager of the resource, was unable to control to the satisfaction of the local resource users. As a result, various forms of local community management developed that, although subject to the same constitutional and collective-choice rules, had different manifestations at the operational level. These operated at varying levels of efficiency and satisfaction to the stakeholders. It could be argued that at one end of the spectrum, Ban Luang suffered from being too large, with too many stakeholders and not very restrictive operational rules, leading to internal conflicts among the different stakeholders. With a watershed less rich in resources this situation could already have led to the disintegration of the hard–won community initiative to control extractive behavior for the

benefit of the villagers. Thung Kao Hang, on the other hand, is perhaps too small. Although this helps in terms of villager input to decisions and recognizing fellow users, the small watershed is under severe resource pressure, and outside recognition from the government has not been as forthcoming as in the other larger initiatives.

Although Ban Pae is smaller than Thung Kao Hang in terms of both the size of the watershed and number of users, the long history of community awareness of the importance of maintaining water supplies from the watershed, the richness of the forests, the well–defined nature of the watershed, and ease of identifying eligible users, coupled with the relative wealth of the community and increased dependence on off–farm employment, have led to a very strong and robust institution. These conditions have perhaps made Ban Pae more of an exception than a representative village in the north, although Faichampa (1990) also draws attention to the importance of having other employment activities for villagers as being a major factor contributing to protection of community watersheds. On the other hand, Silalaeng probably provides the most typical situation allied with the best model for community–based watershed management. The initiative is of medium scale with not too severe population pressures on the resource base. There is good recognition of fellow users. Although the boundaries of the watershed may not be distinct to outside intruders, they have been clearly marked by the villagers. The main strength of this case is the clearly specified operational rules and penalties for infractions that have gained wide acceptance in the community.

Although differences in institutional performance were discerned between the watersheds, these can change in the future. A robust institution can soon be weakened in the face of users discarding their obligations for reciprocity, for example. Similarly, institutions that may now be considered fragile can become more robust if they strengthen their weaknesses. The new draft bill on the establishment of legal forest communities that is now under consideration would, if adopted, require forest community committees, forest community officials, and provincial forest inspection committees chaired by the provincial governor. While in some cases this may lead to the strengthening of some weaker local institutions, stronger ones, such as Ban Pae and Silalaeng, may in fact be weakened by this regimentation and apparent greater degree of reliance on outside authorities. Sensitivity to the local situation will be required to maximize the benefits brought about by the legislation without detracting from the benefits that can be gained through local self–determination.

Notwithstanding these concerns with the proposed new legislation, there is clearly great potential for community–based watershed management to provide a more flexible and responsive form of institutional framework for managing local resources on a sustainable basis in some situations than the more monolithic and distant state mechanisms. This article indicates some of the characteristics that seem to be associated with more effective local management regimes. However, it has not measured how effective such regimes may be in terms of biodiversity conservation, and whether they can be as effective as or more effective than more centralized forms of administration. Although all communities had forest protection regulations, none had any consideration for wildlife protection, and this seems to be a common factor in virtually every other community–based case that has been described in the literature or that we have examined. Fox et al. (1996), in a case study in Langtang National Park in Nepal, for example, reported that although community–based agreements worked quite effectively in terms of preserving livelihood sustainability, they were not effective in protecting populations of the

endangered red panda. This study was also not designed to test community–based management regimes against villages respecting state–controlled regimes in terms of the integrity of the resulting resource base of the communities. A much larger comparative study would be required to make valid statements on this issue.

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