CAN LOCAL COMMUNITIES MANAGE WATER RESOURCES SUSTAINABLY? EVIDENCE FROM THE NORTHERN THAI HIGHLANDS

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Abstract

The question whether local communities in highland areas have the capacity to manage their resources in a sustainable way has occupied scientists, development practitioners and policy-makers for many decades. Drawing on qualitative and quantitative surveys conducted from 2002-2004 in six ethnic minority communities located in protected areas in two provinces in northern Thailand, this paper analyses the roles, interests and tenure relations of various stakeholders in the control and use of water resources. Results suggest a high complexity of rights, norms and regulations, which is in stark contrast to the common perception of water as an open access resource. In addition, external interventions at the local level are analysed, and inequitable access to water resources within local communities and at the subcatchment is identified. The major conclusion of the study is that policy-makers and staff of government agencies must recognize the complexity of local water tenure regimes and their inherent power relations. Water policies and interventions in water management need to draw on stakeholder participation and have to be flexible and transparent. A comprehensive legal framework for land and water tenure has to be set up to secure highland people's rights and enable them to withstand pressure from large-scale investors.

Additional Keywords: tenure, rights, legal, complexity, pluralism

Introduction

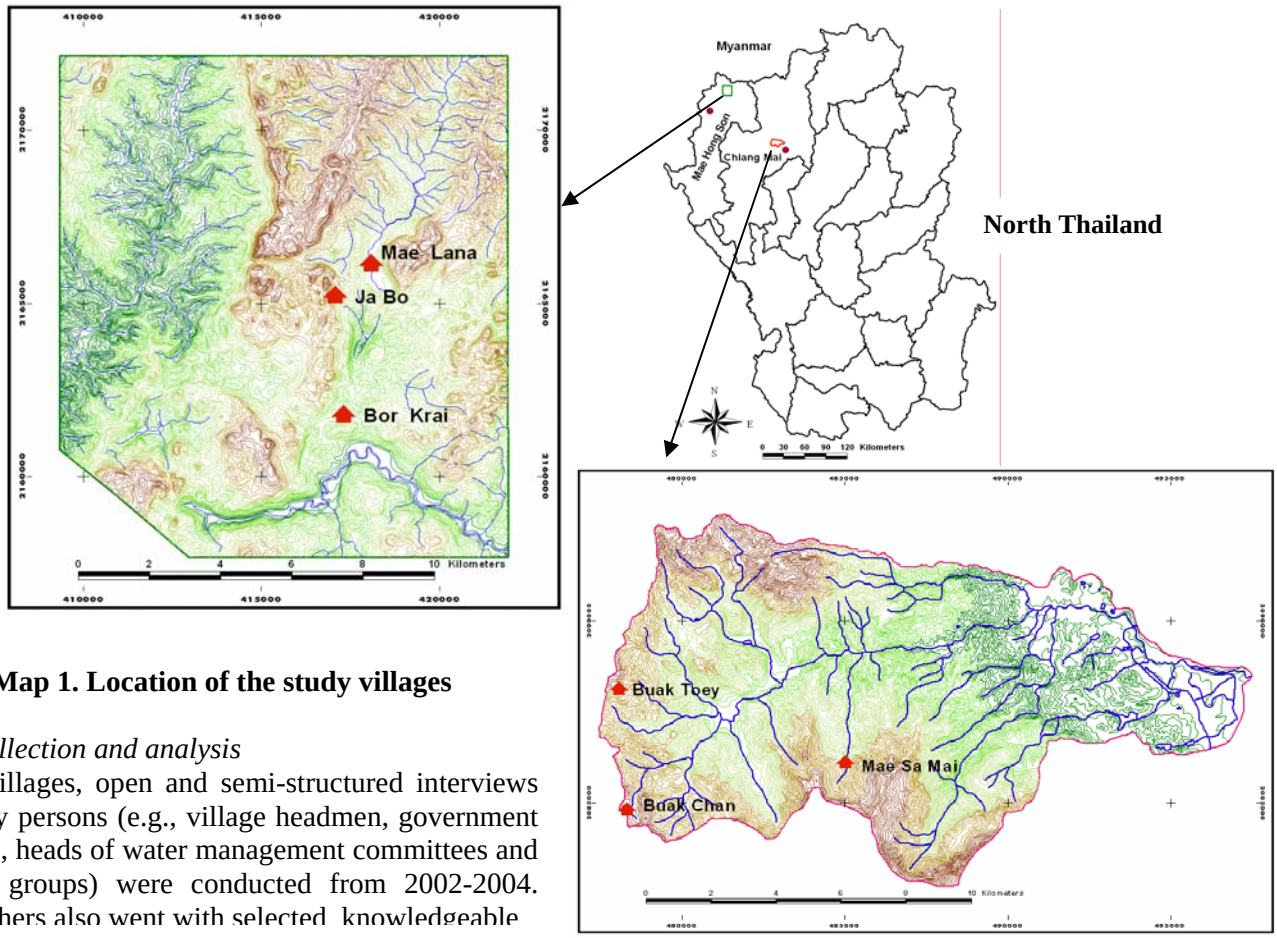
In Thailand, the perception of water as an open access resource is widespread among policy makers, the existence of diverse forms of control, ownership and use rights of water resources being widely ignored. It is believed that water is overused as a consequence of the inability of local communities to establish viable regulations that would guarantee a more sustainable use of water resources. This perception is often used as an argument for enhanced state control of the management of water resources. Many NGOs, on the other hand, claim that local communities share common values about water rights and management, that communal management guarantees equal access to water resources and that all community members act according to locally established rules of water management. This 'ethno-romantic' position tends to neglect power relations within local communities that can lead to strong internal disparities in resource access and to resource control by local elites and investors from outside. In this paper we present results from two surveys conducted between 2002 and 2004 in six ethnic minority communities (Hmong, Lahu, Shan) located in protected areas, such as national parks, wildlife sanctuaries and forest reserves, in Chiang Mai and Mae Hong Son provinces in northern Thailand. The study was done in the framework of a Thai-Vietnamese-German Collaborative Research Program (SFB 564) "Sustainable land use and rural development in mountainous regions of Southeast Asia".

Materials and Methods

Field sites

Mae Sa Watershed. Three villages in Mae Sa watershed in Chiang Mai province, northern Thailand, were selected for this study (Map 1). Mae Sa watershed is located in the outskirts of the northern Thai capital Chiang Mai and feeds into the Ping river, one of the major tributaries of the Chao Praya river. This watershed is intensively used for market-oriented agriculture, mainly fruit, flower and vegetable production (Table 1). The share of irrigated land in total agricultural land and use of agrochemicals in both valleys and hillsides is continuously increasing.

Pang Ma Pha District. The district of Pang Ma Pha in Mae Hong Son province is located close to the Thai-Myanmar border (Map 1). It was one of the main intervention zones of the Thai-German Highland Development Program (TG-HDP) which phased out in September 1998. As infrastructure is poorly developed and market access difficult, the village economies are mostly dominated by subsistence agriculture based on fallow systems. Irrigated agriculture is confined to a few areas in the valley bottoms where paddy cultivation predominates.



Map 1. Location of the study villages

Data collection and analysis
In all villages, open and semi-structured interviews with key persons (e.g., village headmen, government officials, heads of water management committees and women groups) were conducted from 2002-2004. Researchers also went with selected knowledgeable villagers to the various weirs, reservoirs and other storage and conveyance systems and asked questions about water rights, management, use and conflicts.

Location of water sources was determined by a mobile Global Position System (GPS) and integrated into a Geographic Information System (GIS). Participant observation was applied in the case of conflict mediation, e.g. when water committees made field trips to areas of water conflicts. The study was completed by a review of existing research documents and project plans about the study area.

Table 1. Characteristics of the survey villages

	Mae Sa Watershed, Chiang Mai province			Pang Ma Pha district, Mae Hong Son province		
	Buak Chan	Buak Toey	Mae Sa Mai	Mae Lana	Bor Krai	Ja Bo
Ethnic group	Hmong	Hmong	Hmong	Shan	Lahu	Lahu
Inhabitants	750	400	1700	520	250	330
Altitude [masl]	1140-1380	940-1360	700-1380	800-1150	700-1000	800-1150
Market access	Good	good	very good	difficult	moderate	difficult
Main crops	Flowers, vegetables, fruits	Flowers, fruits, vegetables	Fruits, vegetables	Paddy rice, tea, beans	Upland rice, maize, vegetable	Upland rice, maize, beans
Agrochemical use	high	very high	high	moderate	low	low

Results

Management of irrigation water at the community and farm level
Management of irrigation water in upstream Hmong communities of Mae Sa Watershed. Under the opium replacement policy of the Thai government, land use in Mae Sa Mai, Buak Chan and Buak Toey changed from poppy cultivation and upland rice over corn and coffee production to its present land use system, consisting mainly of cash crops such as flowers, vegetables and fruits. Today, a major share of the agricultural fields are irrigated. The highest complexity of irrigation management exists in the largest Hmong community, Mae Sa Mai. Three main water tenure systems have developed over time, (1) individual water use rights, (2) user groups sharing the same pipe or ponds, and (3) user groups sharing the same springs or creeks. The establishment of user groups follows pragmatic economic considerations: farmers sharing the same compartment, pond or pipe are owners of

neighbouring orchards and belong to different clans in the village. This is in stark contrast to the traditional social structure of Hmong society in which cooperation between members of different clans is not very common (cf. Cooper, 1984). Those farmers who were first to build reservoirs and pipes have first priority in water use ("first come, first serve" principle), causing an unequal allocation of water. Hence, water use rights strongly reflect local power relations, with members of local elites controlling the water conveyance systems by tapping water directly from the source and by claiming a bigger share than others, since the less powerful would not dare to interfere.

Powerful farmers also have the opportunity to take water from different sources and thus are able to use the legal pluralism at community level to their own benefit and to diversify risks in a rapidly changing institutional environment (Neef *et al.*, 2004). In Buak Chan, the main sources for irrigation water are ponds in a narrow valley beneath the village settlement. Most of the ponds (4 communal, 17 private) are converted paddy fields bought from a Thai farmer of the neighbouring village of Gong Hae. All ponds are fed by springs or by stream water and have been dug into the ground. As all fields are located in a higher altitude and most of them even on the other side of the mountain ridges, farmers need pumps to transport the water via pipes to their flower and vegetable plots. Hence, in Buak Chan, water and land use rights, which traditionally have been closely connected to each other, are today completely segregated. Private ponds are used either by individual farmers or by close relatives in a shared arrangement. The four communal ponds can be used by any villager who has enough capital to install a pump and connect it through a plastic pipe to a private storage facility in his or her field. Thus, a common-pool resource is being gradually transformed into an individual commodity. Water-saving irrigation technologies, such as drip-irrigation, are rapidly expanding in the village.

The individualization of access to water did not cause a high degree of inequality among the villagers. The major reason is that most farmers have successfully engaged in profitable and diversified cash crop production, while protecting their land and water resources against outside investors and speculators. The situation is entirely different in the village of Buak Toey, which is located on the opposite side of the valley. For several years, outside investors have got a strong grip on the village territory of Buak Toey. Taking advantage of the insecure tenure situation of the villagers who do not have land titles, some investors have cleared large tracts of forestland in protected areas - under the eyes of the forest authorities - to grow cut flowers (roses) on a large scale and to construct a private resort. Among the investors is the *kamnan*, the head of the sub-district administration, which makes any legal action by the villagers against the land grabbing virtually impossible. The land occupancy by investors goes along with an individual appropriation of water resources, as one major creek flows through the investors' land. While farmers in Buak Toey cannot afford to buy pumps and have to resort to gravity irrigation, the investors have installed a system of pumps, wells, weirs and reservoirs to secure their access to irrigation water. Resident farmers tap the remaining water directly from the remaining creeks through pipes that are connected to storage systems in their fields.

Management of irrigation water by the Shan in Mae Lana. Cultivation of paddy rice is the most important agricultural activity in Mae Lana. Water for cultivation of the paddy fields, is gained through the *muang-fai* system which diverts water from the Mae Lana river through an elaborated system of weirs and canals. The *muang-fai* system (*muang* = small canal; *fai* = weir) is a traditional form of irrigation system common in many areas of northern Thailand. Formerly the whole construction of weirs and canals was made of simple material such as stones and bamboo by villagers themselves. The maintenance of the *muang-fai* system is done by the users under supervision of the group leader called *gae muang*. He has the responsibility to ensure allocation of water to all members of the *muang-fai* system and to mediate in case of conflicts between the users. The position of *gae muang* is obtained by vote for an indefinite time as long as his performance is deemed satisfactory. In the *muang-fai* system, land and water rights are closely linked as only farmers with fields along the canal system can get access to water. The allocation of water follows a rigid schedule, with the fields located downstream receiving water first. Problems were only reported by villagers from neighbouring villages who have bought or rented paddy fields in Mae Lana. Villagers from Ja Bo – where paddy rice cultivation is not possible due to limited water resources and government restrictions – stated that they are disfavoured with regard to access to irrigation water by the long-established water institutions in Mae Lana. In Bor Krai, which is located in a wildlife sanctuary, irrigated agriculture is forbidden by forest authorities. Two villagers have bought paddy fields in a downstream Shan village.

Management of water for household consumption

Water for household consumption in Mae Sa Watershed. Household water supply is of high priority in all Hmong villages. In the largest community of Mae Sa Mai, household water supply is managed by the heads of the six zones

into which the village is subdivided. These zones are generally inhabited by members of the same clan which leads to a water management for household consumption along kinship relations, in contrast to the management of irrigation water which follows geographical locations of fields and technical possibilities. Villagers are not charged any water fees, but have to respect irrigation restrictions in the upper part of the watershed in order not to jeopardize the water supply of the residential area. The household water system in Buak Chan and Buak Toey is also managed in a communal way, but users have to pay a water fee according to the amount of water used which is measured by water meters.

Water for household consumption in Pang Ma Pha. In all three villages water is managed on a communal basis. Ja Bo and Bor Krai belong to the more than 16,000 villages in Thailand which still have no permanent access to safe drinking water. Both villages suffer from water shortages for household supply during the hot and dry season from February to April. Although Ja Bo has eight different water sources, there is only one that does never fall dry. To ensure drinking water supply during the dry season, households are not allowed to do their laundry in the village but have to go directly to the remaining water sources outside the residential area. Non-compliance with this rule would result in a fine. Water for livestock is taken from sources with lower water quality. One of the eight water sources in Ja Bo is considered as sacred and is mainly used for ceremonial purposes. The area around the water source is strictly protected. Similarly in Bor Krai, the sources for household water are protected and nobody is allowed to cut trees around the area. Villagers reported regular internal conflicts over water in the past, but stated that the situation improved by assigning one respected person to be responsible for water issues in the village. Distribution of household water in Bor Krai appears to be relatively equitable and local elites do not seem to be better off than other community members. This is in contrast to the situation in Mae Lana where a local guesthouse – owned by the *kamnan*, the head of the sub-district, and build to accommodate foreign eco-tourists – is the first party to use water from one of the two existing supply lines. Consumption water for two of the six village sections can be easily cut off by a valve, thus jeopardizing water security for many households in the village.

Conflict and resolution mechanisms at the subcatchment level
Until the mid-1990s, some farmers in the Shan village of Mae Lana used a water source formed by three springs located near the neighbouring village of Mai Hung for irrigating paddy fields and vegetable plots. At that time, Ja Bo was looking for an additional water source for drinking water. One of the water sources within the village territory of Ja Bo had to be abandoned by the villagers when the residential area of the village was moved to a higher altitude, following a malaria epidemic associated with the previous location. Villagers were not able to invest in water-lifting facilities such as diesel pumps. The water source used by farmers of Mae Lana was located at a more convenient location with a higher altitude which allowed water conveyance to Ja Bo by gravity flow. After negotiations with Mae Lana, which had been mediated by the *kamnan* (head of the subdistrict), the two villages came up with an agreement to exchange their water sources. It was agreed that Ja Bo was allowed to use the water source formerly under control by the Shan of Mae Lana, but had to grant Mae Lana villagers access to the Ja Bo source in return. Several farmers from both villages had to abandon their irrigated fields located next to the water sources as a consequence of the bargain which indicates that the welfare of the community is regarded as being of much higher value than benefits of individual farmers.

External interventions by government agencies
The management of water resources in Thailand is characterized by institutional and legal pluralism, responsibilities being shared among as much as eight different ministries, divided into more than 30 ministerial departments (Sethaputra *et al.*, 2000). This institutional complexity is also translated at the local level. Institutional pluralism in Pang Ma Pha district is mainly due to the long-term co-existence of various government agencies and different international development projects and NGOs. In the small Lahu community of Ja Bo, for example, direct and indirect influences on water tenure and management were the results of interventions from as many as five government agencies, three development projects and one local NGOs. In the neighbouring Shan village of Mae Lana, different government agencies have tried to improve both the traditional *muang-fai* system for irrigation and the supply of water for household consumption by installing modern water storage and conveyance systems. Although these 'improvements' have not yielded the expected results, most water projects in the village have been discontinued. In all three Hmong communities investigated in the Mae Sa Watershed, the Royal Forest Department (RFD) through its policy of reforestation, forest protection and delimitation of forest boundaries indirectly influences the water management system. In Mae Sa Mai, the power of the RFD is counterbalanced by other government agencies, such as the Royal Irrigation Department, and national projects, particularly under the Royal Project Foundation. Recently, these agencies have started to exert more influence on the customary system of water

management in Mae Sa Mai. In early 2002, the construction of a big reservoir was completed that was designed to secure the water supply for most litchi orchards in the subcatchment. However, long-established families and lineages in the village continue to take water directly from the stream in a joint water management arrangement and thus bypass the new reservoir that is running dry. Whereas the construction of the new reservoir could in principle provide a more equitable distribution by opening up water access to less influential people in the village, the agencies responsible failed to recognize local power structures and involve the villagers in planning the reservoir and setting up a workable schedule. The people who currently control the customary water conveyance system are afraid of losing power and influence; other villagers fear that the Royal Project will be the main user of the new reservoir and will not be able to work out an adequate user scheme. Those villagers, however, who are disadvantaged by inequalities in the customary system, are positive towards a big reservoir and external interventions in water use regulations. They argue that the local water management group does not have enough power to ensure equitable access to water (Neef *et al.*, 2004).

Discussion and Synthesis

Scholars in the field of property rights and collective action have amassed considerable theoretical reflections and empirical evidence to identify the conditions under which common property regimes are appropriate to govern common-pool resources, such as small size of community, clear boundaries of the resource, low market pressures and strong enforcement mechanisms (Wade, 1988; Ostrom 1994; Balland and Platteau, 1996). Results of the case studies suggest that management of water resources at community and catchment level involves a complex interaction of demographic, geographical, technical, economic, institutional and social factors: in one case, market pressure might exacerbate conflicting situations (such as in the case of Buak Toey), while in another context commercialization can actually contribute to more equitable access and conflict resolution (see the case of Buak Chan). In the more subsistence-oriented area of Pang Ma Pha equitable access to water is ensured by communal control of water resources, whereas in the market-oriented villages of Mae Sa Watershed, the continuous shift from communal to individual management of water resources had mixed effects on distributional equity (*cf.* Table 2).

Table 2. Comparative analysis of the six study villages as regards water tenure and management

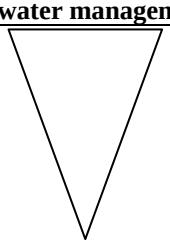
	Mae Sa Watershed, Chiang Mai province			**Pang Ma Pha district, Mae Hong Son province**		
	Buak Chan	**Buak Toey**	**Mae Sa Mai**	**Mae Lana**	**Bor Krai**	**Ja Bo**
Ethnic group	Hmong	Hmong	Hmong	Shan	Lahu	Lahu
Social cohesion, potential for collective action	+++	+	+	++	+++	+++
Degree of individualization of water rights	+++	++	++	++	+	+
Equity of water access	+++	+	+	++	+++	+++
Relative importance of irrigation water	+++	++	+++	++	+	+
Influence of outside investors	+	+++	+	+	+	+
Village-internal water conflicts	+	+++	++	++	+	+
Government interventions	++	+	+++	++	++	++
Upstream-downstream conflicts	++	+++	+	++	+	+

Legend: + low, ++ moderate, +++ high

Results of the case studies also show that the view of water in highland watersheds of northern Thailand as an open access resource is largely inaccurate. Instead, control over and use of water resources is subject to different tenure regimes, rights and obligations. With an increase of the relative importance of water used for irrigation (as compared to water for household consumption), a higher degree of complexity of water rights is likely to evolve. In this context, rules and regulations are not equally respected by all members of the community; local elites or outside investors often use their social or economic status to increase their share in the control over water and land resources. Hence, the romanticizing picture that some NGOs tend to draw about local communities as harmonious and peaceful entities, working towards a common goal of sustainable resource management and acting according to local rules, cannot be confirmed. Particularly in larger communities and areas with a high degree of commercialization of agriculture, solidarity and collective action are often confined to close relatives and friends.

In combination with weak tenure rights, the lack of social cohesion beyond the family or clan level undermines the potential of communities to withstand influences from outside investors and from local authorities abusing their power to gain control of local resources.

Table 3. Ranking of study villages according to different dimensions of sustainability

Degree of sustainability of water management	Economic dimension	Social dimension	Ecological dimension
	Buak Chan	Ja Bo	Bor Krai
	Mae Sa Mai	Bor Krai	Mae Lana
	Buak Toey	Buak Chan	Ja Bo
	Mae Lana	Mae Lana	Mae Sa Mai
	Bor Krai	Mae Sa Mai	Buak Chan
	Ja Bo	Buak Toey	Buak Toey

Hence, the question whether local communities can manage water resources in a sustainable way does not lend itself to an easy answer, particularly if different dimensions of sustainability are considered. In Table 3, the six study villages are ranked in descending order from high to low sustainability along the three dimensions that have become a common reference since the first World Summit in Rio de Janeiro in 1992. Whereas the three villages of the market-oriented Mae Sa Watershed with their highly diversified income opportunities from irrigated cash crops are leading the scale in the economic dimension, the largely subsistence-oriented villages in Pang Ma Pha district tend to have a better ranking in the social and ecological dimensions, due to greater social capital in managing water resources and less environmentally harmful agricultural practices.

Conclusion and Policy Implications

Community-based institutions have a potential for enhancing sustainable water management in northern Thai watersheds if the social cohesion within local communities remains intact and elected local authorities can be held accountable for their actions. In cases, however, where local elites or outside investors have undermined the capacity of those institutions, external interventions are justified. In the past, many of these interventions have faced difficulties in enhancing more equitable access to water and increasing efficiency of water management due to lack of coordination, transparency, and participation of local stakeholders. A prerequisite for future action is to carefully assess the existing rights to water and other natural resources and the various trade-offs between economic, social and ecological dimensions of sustainable water management. Local authorities and representatives of government line agencies should refrain from "using overly simplified notions of what are in practice complex, constitutive concepts" (Ostrom, 2001, p137). Rather than simply providing technical assistance, such as building water conveyance and storage systems, they should be enabled to play a stronger role in facilitating changes of inequitable tenure regimes through understanding the local social and economic context of the communities they are working with.

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