Prathuang Narintarangkool na Ayudhaya and Helen Ross

Integrated Catchment Assessment and Management
School of Resource Management and Environmental Studies
Australian National University
Canberra ACT 0200
Australia

Fax: 61-2-62490757
Email: hross@cres.anu.edu.au

Stream: Global Themes
Discipline: Social sciences/environmental studies

From Conflicting to Shared Visions for a Commons: Stakeholder's Visions for Integrated Watershed Management in Thailand's Highlands

INTRODUCTION

The forested highlands of Thailand were originally settled as a commons, the domain of a number of ethnic minorities practising two distinct forms of shifting cultivation under their customary laws. Some have longstanding residence, probably predating creation of the nation state of Thailand, while others have migrated into the contemporary territory of Thailand in the past two centuries. Upland migration of ethnic Thais, seeking new areas for agriculture, has added to population growth and the extent of land farmed. Customary ownership and management of these lands enjoys little formal recognition by the Thai government, which also claims ownership and management of the land. Much of the land has been declared as forest reserves, known as ‘protected areas' (including National Parks). Over a third of the Ping River basin, our area of study, is classified in the strictest category of watershed protection, set aside for conservation forests and headwaters. These areas are supposed to remain under or be returned to permanent forest cover, despite the longstanding agricultural and residential use of much of the area by ethnic minorities. Villagers in such areas are nominally under threat of relocation, although few government departments actively favour this option at present.

The highlands are also recognised as crucial in environmental terms, as the headwaters of Thailand's main drainage basin and the largest remnant of Thailand' rapidly declining tropical forests. Key issues are deforestation, soil erosion, water quality and quantity, and biodiversity. Related to these are questions of population, which is increasingly rapidly owing to natural increase and migration, and issues surrounding the environmental impacts of agricultural practices.

The environmental issues in Thailand's highlands are inter-related with relationships among stakeholders. The construction of the environmental issues is very much a 'top-down' one on the part of government, and an ethnocentric one on the part of the majority population of ethnic Thais. Although the demands on the highlands environment are many and complex, local people receive arguably more than their share of the blame for environmental degradation, for their practice of shifting cultivation, and for deforestation, pesticide and fertiliser use associated with new cash crops. The pressures occur in a multi-dimensional policy environment, in which a number of government agencies pursue the loosely integrated aims of preserving national security in the border areas, deterring opium growing, promoting the economic and social development of highland minorities, and environmental management.

Since the early 1960s the government's strategies to achieve forest and watershed protection have revolved around controlling encroachments into forest through policing, a resettlement policy[1], encouraging permanent settlements, promotion of permanent agriculture using modern technology, and strict natural resource laws. Thus environmental and community development policies have been integrated in set of policies to stop opium growing and shifting cultivation, control the borders and prevent communist expansion (Kesmanee 1988, McKinnon 1988). Permanent agriculture is promoted to reduce the land areas farmed, and particularly to replace shifting cultivation, which the government have views as a cause of deforestation, soil erosion, water shortage, and floods in the lowlands. They are equally promoted by both government and NGOs as a solution to poverty. Overall, these strategies have been criticised as inadequate to solve highland environmental degradation, and as being based on misunderstanding, or insufficient understanding, of the effects of shifting cultivation (Hinton 1975, articles by Kunstadter, Zinke, Sanga in Kunstadter et al. eds.1978). Meanwhile, the policies have focused these multidimensional issues into a conflict over land and land use, between the Royal Forestry Department (carrying prime responsibility on behalf of the government) and highland people (Anan 1992, Vandergeest 1996, Prathuang 1997).

Our research is part of an interdisciplinary program to develop a framework for integrated water resources assessment and management. It includes participatory research to elicit, compare, and hopefully to help to integrate, the different visions for development of particular highland watershed held by local people (ethnic minority groups and lowland Thai farmers), government departments, NGOs and business interests. It also acknowledges the effects of highland practice on downstream water users. Other stages of the research include resource assessment, and the development and evaluation of options for the sustainable development of the highlands (Jakeman, Ross and Wong 1997; Ross, Narintarangkool and Wong 1997).

This paper describes the visions of stakeholders in two of the four sub-catchments we are studying in the Mae Chaem watershed, Mae Pan, in the middle reaches of the system, and Mae Lu, in the lower reaches. The Mae Chaem is a tributary of the Ping River, and lies to the west of the well-known northern town of Chiangmai adjoining the Burmese border. The visions are compared using conflict mapping techniques, with a focus on underlying needs as well as the stated aims of each stakeholder. Our interest is in exploring the capacity to improve stakeholders' understanding of one another's situations and needs, identifying the potential for stakeholders to develop shared visions for the development of these catchments, and for them to enter into participatory process of local policy-making and environment management. Are there

[1] Relocations have occurred at least three times between the 1960s and 1990s. In practice, departments recognise great difficulties with this approach.

prospects for some forms of co-management of these watersheds, and if so in what form? This paper is based on work in progress, since not all stakeholders have been interviewed yet.

The main ethnic groups in the Mae Chaem are Karen (predominant), Hmong, and Khon Muang (lowland Thai). There are also some Lisu and Lawa, not represented in our study.

The Hmong live and farm at the highest elevations, over 1000 metres above sea level. Their traditional pattern of agriculture is one of 'primary' swidden agriculture, in which an area of forest is cleared, farmed until soil fertility is exhausted, then abandoned for new plots. Land availability now makes this system extremely difficult to practise. In recent years the Hmong have been encouraged to substitute opium growing for commercial crops, grown on permanent fields. The Karen occupy middle elevations, between about 500 and 1000 metres above sea level. Their traditional system combines rice growing on permanent paddy fields, with the 'rotational' system of swidden farming in which a series of fields is farmed in turn on a long cycle. Land not currently cropped is allowed to regenerate naturally with forest species. Subsistence use of forest products, home gardening and animal keeping supplements the agricultural system. Lowland northern Thai people (Khon Muang) have been moving gradually into the highlands over many years, now occupying land up to 500 metres. Their system of agriculture is somewhat similar to the Karen's, combining paddy rice, rotational cropping of upland fields, with subsistence use of forests. The Karen and Khon Muang agricultural systems are described in more detail in the case studies below.

Government agencies active in environmental protection and highland development in the Mae Chaem include four divisions of the Royal Forestry Department, the Office of Highland Development (linked to the Department of Land Development), the Division of Highland Agriculture Promotion (within the Ministry of Agriculture), District Governors, Rapid Rural Development Unit, and Royal Irrigation Department.

MAE LU CASE STUDY

Mae Lu is a steep-sided valley in the lower reaches of the Mae Chaem river system, and lies south of the town of Mae Chaem. Karen people predominate, although Khon Muang people farm the lowest slopes near the confluence with the Mae Chaem. This analysis concentrates on the Karen visions for the catchment environment, and those of the Royal Forestry Department and the Office of Highland Development.

STAKEHOLDERS AND THEIR RESOURCE USE

The Karen villages in the subcatchment group into two categories, those able to maintain a shortened version of the traditional rotational cropping cycle on their swidden fields, and those which now rely on permanent agriculture (with short fallow periods) in their former swidden fields. Both groups use a combination of permanent paddy fields, upland fields and subsistence gathering from forests, along with home gardening and cattle raising. The area under paddy rice is 316 rai (50.5 hectares), with 682 rai (109 hectares) under wet season soy crops (Office of Agricultural Economics data, 1992). Five years ago the five villages had a total population of 452, in 90 households (Department of Land Development data, 1993). These figures suggest the average paddy land available per household is about 0.6 hectares. The ages of the villages at their current locations ranges are recorded as being from over 30 to over 100 years (Department of

Land Development data), though it is known that Karen presence in the highlands is over two hundred years, arguably much longer.

Management of upland fields

Villages maintaining swidden agriculture

Three of the five Karen villages in our study area rely on a modified rotational swidden system, with short cultivation and a long fallow period, as their main source of food. A minority of these farmers combine swidden agriculture with wet rice growing on paddy fields (see below). Owing to land pressures, the rotation cycle is reduced to one year's cultivation followed by a five year fallow (forest regrowth) period, insufficient for a satisfactory variety of foods to be grown in each year, and also insufficient for soil fertility to recover during the fallow period. Traditionally, Karen prefer a fallow period of over ten years, to allow the soil to recover fertility.

Villages reliant on permanent agriculture

The other two Karen villages in Mae Lu, cannot continue with shifting cultivation owing to land pressures, despite desires to do so. While population and land pressures have been building up in the highlands for several decades (Kunstadter and Kunstadter 1992, Pasuk and Baker 1995), they are exacerbated by consistent pressure from government agencies to replace shifting cultivation with permanent agriculture using modern agricultural technology. They have reluctantly moved towards a permanent agricultural pattern since the early 1980s, both for subsistence and market production. Under this pattern, each household divides their land into three or four small fields (depending on the extent of their land), maintaining one fallow field while the others are cropped the soil fertility is exhausted. At best some Karen people can cultivate a field for about 10 to 15 years then leave it fallow for 3 to 5 years: this allows some recovery of soil nutrients during the fallow period. Other farmers manage shorter cycles, by using fertilisers, perhaps involving a middle-man to finance this investment.

This pattern has led to rapid declines in soil fertility and an increase in insect pests, causing low yields and a threat to food security. Some government agencies have attempted soil conservation by promoting alley cropping and land terracing on the Karen's permanent fields, but have not succeeded for several social and environmental reasons (Nootsuporn 1997). In social terms, a great deal of labour and time is necessary for planting along contour lines and weeding, and the people have not achieved returns on this investment, so have abandoned the practices. The Karen are also disturbed about environmental factors. To make terraces or start alley cropping, they have to clear-cut trees and dig out and discard the roots. This encourages soil erosion owing to the loss of forest cover and root structure, which then deposits unwanted sediment on the terraces below. Clear cutting and removal of tree roots has also encouraged weeds in the permanent fields, affecting yields as well as increasing input costs.

The Karen in these two villages have attempted to manage the environmental problems created by more intensive cropping of limited land, by using chemical fertilisers and pesticides. This contributes to indebtedness.

Fortunately, these two villages have well established paddy fields (see below): the area of paddy is over two-thirds that of upland fields, and the figures available[2] suggest that three-quarters of households own paddy. Some households (perhaps about a quarter of households)

[2] These estimates combine our figures with those of Office of Agricultural Economics, 1992.

only require shifting cultivation as an additional contribution. However, the paddy fields are affected by sediment flooding from the shifting cultivation land located above them (see below).

In the past, land for shifting cultivation was owned by family or clan units within each village, but the fallow land was the common property of a village. In the past decade[3] the shifting cultivation system has suffered tensions between customary and private property ownership and management, since the government system of land titling has no direct equivalent to customary tenure. Both private ownership and government ownership (the two basic forms of land title available) may affect traditional land management, especially the land inheritance system and management of labour. Non-Karen may buy land instead of Karen inheriting it. Private property owners may not conduct shifting cultivation, or feel obliged to contribute labour to maintain the fallow land. The expansion of the market system into Karen villages has led to a desire for more security of land tenure, especially among Karen people who produce cash crops, who seek titles as security for low interest loans. Proposals in the Community Forestry Bill[4] were designed to safeguard the traditional system of shifting cultivation.

Paddy fields

Although the Karen have few paddy fields, they value them highly. In areas with sufficient low-slope, irrigable land, and few villages competing for it, paddy fields can be the main source of production, with swidden and subsistence from the forests as a supplement. Paddy fields have also been affected by the changes in land availability and the land use systems. In the past, the Karen people usually used paddy fields to produce rice in the wet season as their main crop, then grazed cattle and other labour animals there in the dry season. During the wet season the animals were moved into the forests. Some areas near the river were also used to grow vegetables for subsistence and local sale. Intensive dry season cropping of vegetables for the market is now common in paddy fields, displacing the cattle and their role in soil fertilisation.

All of the villages have some paddy rice, although ownership is not widespread in the first three villages. The second two villages maintain the traditional pattern of rice production in the rainy season and cattle grazing after the rice harvesting. However, sediment flooding resulting from permanent agriculture in the former shifting cultivation land above the paddy fields reduces rice yields. The people have attempted - without success - to dig canals to trap the sediments. They believe that the soil erosion and sedimentation is too severe to control through human technology, and that the land should be allowed to function according to natural or nearly natural mechanisms. This would entail stopping permanent agriculture above paddy fields and allowing the forests to regenerate to prevent soil erosion, a proposal which would affect the shifting cultivators unless the land were returned to shifting cultivation.

Unlike land for shifting cultivation, paddy field terraces are owned privately. The Karen households which established or have inherited the fields are recognised as private owners under Karen customary law, because the Karen accept that the owner has invested more than other land users and thus should enjoy more stability than users of shifting cultivation land in their land

[3] Foreign funded highland development by USAID, and government intervention in highland headwater conservation, both date from 1988.

[4] A Community Forestry Bill has been before the Thai Parliament for several months, apparently stalled over changes made subsequent to a version having been agreed in a public consultation process. We understand it is to undergo further public debate.

entitlements. However, they manage their land collectively in terms of water allocation and sediment control.

While accepted as a customary right in Karen society, the private ownership of paddy fields is not backed by any formal land titles. Since most of the Karen land is located in conservation or mining areas, Karen fear their land being resumed. Their security of tenure depends in practice on avoiding conflict with other stakeholders, especially the Royal Forestry Department.

The Karen private ownership system for paddy fields is maintained in the context of customary land use controls, including the customary laws for water allocation, establishment of paddy fields, and land inheritance. These are matters under community control. For example, water allocation favours rice production over other crops to enhance food security. Thus, all paddy fields are only allocated water for rice production in rainy season, not in the dry. Under customary law, the Karen people who have the right to use paddy fields, have to cooperate to maintain the weirs and canals before the rice production season in order to be allowed to use their land. In order to protect their paddy fields in Karen society, the customary law of inheritance does not allow a man to inherit fields from his wife's family until he has worked in their paddy fields for more than three years.

Like the land for shifting cultivation, the ownership system in paddy fields has fallen into tensions between private ownership under the government's terms (formal land titles) and the customary form of private ownership. While many Karen people want to obtain land titles for their paddy fields so that they can obtain mortgages or sell part of their land, they also want the land owned by Karen people so that they can cooperate by exchanging labour or sharing equipment. Willingness to cooperate depends on whether the new land owner is Karen or from another ethnic group.

Forest management and non timber products

Forestry is part of the Karen traditional land management system, and subsistence from forest products has long been an important part of their complex economic system. They classify forests into four types, protected area or ceremony forests, headwater forests, forests available for use, and 'fallow forests', referring to land in the regrowth stages of the swidden system (Prathuang 1997). Each type is controlled under community 'regulations' incorporated in myths, beliefs, proverbs, and Karen teaching, and sometimes in documents. The customary law does not allow the establishment of fields in places which may destroy headwaters, be disrespectful to spirits or encroach into ceremony forests.

VISIONS

Villagers

Shifting cultivators and upland fields

Most shifting cultivators in both sets of villages would prefer to return to their former pattern of shifting cultivation, with short cultivation and long fallow periods. Their reasons are their belief that this system is reliable in providing food security (far more important to them than market participation), avoids high investment costs, avoids risk and uncertainty, and reduces deforestation and soil erosion. They are, however, prepared to consider other options which do not threaten their subsistence.

A second part of their vision is to obtain land titles, to improve their security of tenure in the context of living on land which the government owns and seeks to convert to forest. There

are both agricultural, and territorial, reasons for the importance of land titles within their vision. However, the coexistence of legal titles with customary land holding procedures has created some social impacts.

Paddy fields

The wet rice farmers want to stop upland soil erosion and sediment accumulation on the paddy fields, since these affect their terraces and damage the muang fai irrigation system. However, they wish the process of solving these problems to be achieved without causing conflict among the villagers. They also wish for high yields.

Forests

Visions for the forests are:

- To manage all categories of community forests (forests for conservation, subsistence use and ceremonial purposes) themselves, according to traditional principles.
- To participate in government forest management under new legal arrangements, particularly in the management of conservation areas.
- For the forests to have good ecological systems, to contribute to the people's subsistence.

Water resources

In similar terms, a muang fai (traditional irrigation) organisation serving the higher villages sought to manage the irrigation by themselves with support from the government for problems or improvements. The reason is that it is convenient to make decisions and organise repairs themselves as required, rather than relying on government. The association serving the lower villages sought enough water for all members and their crops.

These visions for forest and water management reflect a desire for local collective control of resources, but also for cooperation with government. In the case of forestry, cooperation could increase the role of villagers in the management of a resource from which they have until recently risked exclusion. In irrigation, the expense of materials and labour for repairs to damaged weirs and canals has caused the associations to look to government for practical support, without relinquishing control.

Government agencies

Local officials of the Royal Forestry Department explained the department's aims for the Mae Lu subcatchment as:

- To expand the area of protected forest by incorporating fallow shifting cultivation land, in order to maintain forest for the public benefit.
- To protect the watershed for the benefit of everyone in Thailand.
- To have the villagers help with forest protection, including tree planting and fire protection (RFD lacks labour). To have additional staff.
- To change the land use pattern from shifting cultivation to permanent agriculture, or at least decrease the land devoted to shifting cultivation. This relates to the first part of the vision, since it would allow the expansion of protected forest, and reduce deforestation and resultant floods and water shortages lower in the catchment.

- Not wanting conflict with the villagers.

An official of the Office of Highland Development's vision was for land terracing, to protect against soil erosion and land degradation, and provide high agricultural yields.

As one would expect, the government staff's visions accord with their departments' policies for highland development, with minor personal variations such as wanting to avoid conflict with villagers.

NGOs visions are consistent with those of government departments, though the motivations differ. The two projects working in Mae Lu subcatchment seek to improve villagers food security through intensive agriculture in permanent fields, with cessation of shifting agriculture. The dual reasons are a belief that this will help villagers, and to decrease deforestation.

Business groups

Khon muang cash crop farmers have an economic vision for high agricultural yields, price stability, and reasonable or high net incomes. In terms of physical land use, they wish to avoid ecological problems on their land (such as insect pests) because chemical controls cause health problems[5] and high input costs.

Middle-men in this subcatchment sought high agricultural productivity, in order to maximise their net incomes.

CONFLICT AND POTENTIAL FOR COOPERATION

There are essentially two visions for land use in the Mae Lu subcatchment, one (the Karen version) in which shifting cultivation continues to play an important role, traditional or low-technology farming approaches are preferred, and production is more for subsistence than for the market. Community management of water and forest resources also features in this general vision. Underlying needs are for food security, confidence in agricultural knowledge and methods, ecological integrity, community management, and conflict resolution. The counter-vision, shared by government departments, NGOs, cash croppers and middle-men, is one in which agricultural production is for the market, and agriculture is consolidated onto permanent fields in order to release land for increased forest cover. Community management of forests is not part of this vision, although minor roles for villagers are envisaged such as providing assistance in the case of fire, and a labour force for plantations. Underlying needs are for environmental protection (forests and soil), and (arguably) for control. There is a suggestion of a need for conflict resolution: the general vision espoused by government appears superficially as a ‘win-win' solution for the forests and the people, but it competes with the strong Karen attachment to shifting cultivation and Karen beliefs about the functioning of highland ecosystems.

There are also differences among the villagers, for instance between those Karen dependent principally on rice paddy versus upland fields, and those involved in cash cropping versus subsistence agriculture. The main conflicts are between the Karen shifting cultivators and the Royal Forestry Department, over land allocation for shifting cultivation versus forest, and hence continuation of the practice of shifting cultivation. A second conflict is over land tenure, a

[5] We presume the interviewees are referring here to the notorious problems of chemical overuse, exacerbated by illiteracy which prevents understanding of instructions.

Karen strategy for managing the land allocation conflict. Tenure has the potential to clarify who has rights to what land, but affects the balance of power between villagers and the RFD, reducing the government's flexibility for future change. It also causes tensions and incongruities within Karen society, as private and customary forms of landholding coexist somewhat awkwardly.

There are also areas of potential cooperation. The RFD recognises its dependence on villager labour in tree planting and fire protection. Both Karen and government departments have interests in preserving forest cover, though they are in some dispute about where it should be. The Karen are keen to assert their capability of forest management. If the government were to examine its underlying needs in maintaining forests and forest cover, there could be potential for stronger co-operation between the RFD and villagers. If the Karen can maintain successful social controls over the use of forests (bearing in mind that the RFD also has great difficulty controlling against incursions and illegal logging), it should not matter greatly whether management is by Karen or the Department, provided the desired extent and type of forest cover remains. The potential for recognition of Karen forest management, and possibly co-management of the government-managed forests, is now provided for under the new Constitution of 1997 and the Community Forestry Bill. However, many issues would need resolution between the department and the Karen, particularly over community use of forest products.

CONCLUSIONS

The forms of agriculture which prior population and land pressures, and government policies, have pressed the Karen into appear unsustainable. While many Karen are keen to maintain the agricultural practices which they understand well and in which they believe, the system is difficult to maintain on short rotation cycles. The government's assumptions about the feasibility of converting the agricultural base to one of permanent agriculture on less land, also strikes practical problems due to unforeseen environmental impacts, and lack of consistency between the technologies promoted and Karen capital and labour availability. Our interest here is in the potential for shared visions, and for co-operation. At the most basic level of visions, the stakeholders are clearly at odds in a fundamental respect - the future of shifting cultivation. When one examines the needs expressed in the visions:

the government departments and NGOs appear to acknowledge the Karen need for food security, evidenced by their tangible support for permanent agriculture. The departments are perhaps mistaken in assuming that market agriculture is the priority - for the Karen food security is clearly paramount. The way of achieving food security is therefore at issue.

the Karen share the Royal Forestry Department's and other departments' interests in maintaining forest cover, and go further in emphasising healthy ecosystems. (Until now the Royal Forestry Department has counted the Karen forests as part of the State forest, given the Karen don't have tenure. This should change if the Community Forestry Act is passed). Over many years however the Royal Forestry Department's goals have become framed in terms of maintaining the areas officially declared as forests, rather than in maintaining forested areas. This leads to the anomaly of the department remaining manager of many areas which no longer have trees, and oriented to gain more land on which to grow trees. If the government were to reconsider its goals in an ecological way, to emphasise the need for forest cover (of various types) for reasons including biodiversity, water resources, and climate, it should matter less who

controls which land, so long as sufficient forest is maintained for the goals identified. Policies could then focus on the management of forests, and both government and Karen forests could be considered part of the national system.

There appears scope for some form of cooperative management of both types of forest, if relationships between the stakeholders can be improved. Karen have interests in helping to manage all forests, including government ones, and in widening their rights to use certain forest products for subsistence. The RFD recognises some villager contributions, such as fire control. The villagers of Mae Lu have considerable ecological knowledge of both the forest and their farm systems, which could contribute to forest management (some RFD research staff are interested in exploring this potential). Villagers' availability 'on location' near the forests could in principle be engaged to reduce management costs, or increase management effectiveness (even allowing that both villagers and local officials are easily pressured to turn a blind eye to illegal practices). In turn, there may well be roles for RFD staff to participate in Karen forest management, for instance in a collaborative scientific advisory role. Since the Royal Forestry Department, along with other departments, is now exploring ways of implementing the public participation provisions of the new Constitution and the Eighth National Plan, cooperative approaches may emerge quite rapidly.

MAE PAN CASE STUDY

BACKGROUND

The Mae Pan subcatchment is located in a forest reserve area, next to Inthanon National Park. The high slopes of the catchment are heavily forested, while the village areas have mixed deciduous forest of small trees and dispersed bushes. The area was formerly rich in teak, but was denuded long ago by commercial logging. As the local population increased, degraded forest was cleared for agriculture and houses.

STAKEHOLDERS AND THEIR RESOURCE USE

Villagers

The villagers in Mae Pan are Khon Muang (northern Thai) people. Among the six villages we studied, there are 297 households with a probable population of over 1300. The villages have been at their current locations for periods ranging from over 115 years, to around 40 years. Most households have both paddy fields and upland fields.

The main crops are wet season rice, soya beans (both wet and dry season varieties) vegetables and fruits. There is a little upland rice. The people also collect subsistence foods from the forests and streams.

In the past just a few men earned cash income from sale of livestock or wage labour. Collective labour was used in working both rice paddies and upland rice fields, using traditional tools. Commercial crops - soya beans, corn, and several fruits - have been introduced in the past 30 years and now form the basis of the economy. Income is also earned from trading, the sale of animals, cloth making, and for some, working in government service. The commercialisation of agriculture has been supported by various rural development programs.

Prior to the commercialisation of agriculture, land was readily available in the subcatchment. Typically households had one or two plots of land each, cultivated organically.

The increase in commercial crops has led to an increasing demand for land, leading villagers to use previously marginal land. There is no new land available for clearing. Soil quality is deteriorating due to being farmed intensively. Soil in the paddies is also hardening due to the use of motorised ploughs. Villagers are dependent on greater amounts of fertiliser each year, both in irrigated and upland fields, in order to obtain yields.

The land around each house is used for home gardens, keeping animals, and children's play space. The choice of plants in these gardens also helps to maintain genetic diversity. In the past, there was no clear notion of land ownership. It was assumed that whatever land one cleared and worked, one owned. It was unclear who owned upland fields, so different people used it according to their needs or desires. Land nominally possessed by someone might be lent to another to cultivate, without charge. Now individuals rent, buy or inherit all farm land, there being no unused cultivable land available. Deeds conferring limited land title began coming into use over 30 years ago.

There has also been major change in water resources. Villagers report that in the past the water was clean and clear, and there was sufficient for use both in the wet and dry seasons. The major increase in commercial cropping means that there is now insufficient water in the dry season either for agriculture or household use. The water is also polluted with fertilisers, and by tourists upstream bathing and swimming in the water. Villagers no longer like to consume water from the Mae Pan river. As well as the expansion of agriculture, the decrease in water availability is attributed to population increases, and siltation of the river with sand from road building.

The villages have their own rules to maintain the limited forest area remaining. No activities may be carried out in the headwater forest zone, because of the importance of the water derived from this zone. This forest is in high country. Other forest areas near deserted temples are conserved because of fear of spirits. As a result these forests remain relatively untouched. The villagers also seek to conserve forest areas which are distant from the villages, in high country. Forest areas near villages are used, for instance for timber for houses. Villagers are prevented from clearing land by the Royal Forestry Department - they can only clear land which has been cleared in the past.

The six villages included in our study have a variety of problems. Those in common are insufficient land to earn a living (affecting some households more than others), insufficient water (particularly in the dry season), and poor soils, in which naturally poor soils have been depleted further by long cultivation. Crop prices are another problem. Land titles were a concern to one village. Indebtedness, lack of facilities, and drug usage were also named by at least one village each. One village experienced difficulties caused by being close to the National Park, including withdrawal of water for tourist facilities, and pollution of water by tourists.

Government departments and NGOs

Different government departments and NGOs are involved with each village. The Royal Forestry Department is involved with the village nearest the National Park, providing the villagers with fruit trees and annual budgets to prevent forest fires, encouraging the establishment of a village committee concerned with bushfires, and making repairs to the road. In other villages:

- The district agricultural office has promoted new crops including fruit trees.

- The Office of Highland Development provides a budget for building canals and cement weirs, and builds terraced paddy fields.
- The Social Welfare Department assists those in need.
- CARE (NGO) promotes agriculture in one village, and has established a water supply system there.

Past development projects have contributed rice paddies and concrete dams for irrigation systems.

Commercial sector

In this subcatchment, the commercial sector is represented by agricultural middle-men, many of whom work both for agribusinesses and cooperatives. Agribusinesses have formal and informal contracts with villagers. In this subcatchment maize and corn are grown under informal contracts. The system has major environmental impacts, as villagers may expand into forests in order to create new farm land, and it contributes to land degradation.

VISIONS

Villagers and their common property organisations

We have statements of visions for two of the villages, distinguishing visions for different parts of their farming and environmental management system. Since they are similar, these accounts have been merged here.

Paddy fields

Villager visions for the terraced irrigated (rice paddy) land are for land titles (only mentioned by one village), to improve soil fertility (one village said with government help), ecological balance with the surrounding (forest) system; reasonable prices for produce, and solutions to marketing problems, dry season water and labour shortage, and rice crop diseases. Land titles are sought for security of occupation, ability to raise loans, and court evidence in the case of any dispute. Ecological balance is raised in connection with soil fertility, since forests help to replenish soil fertility in their vicinity, and biodiversity in the forest-farm system helps to control insect pests naturally. Prices for produce are particularly salient, for as one village pointed out, farmers were currently losing money on growing soya beans. The environmental and labour problems add to investment costs. One village's vision was not to depend on the market all the time. These visions all relate to an underlying need for food security, and for security on the land. Food security is related to the health of the ecosystem.

Upland fields

For their upland fields the people also seek land titles, reasonable prices for the products grown under contract farming systems, good soil fertility and good ecological balance in the total farm-forest ecosystem. One of the villages wished to avoid forms of production which involve high investment costs. Land titles are sought for the same reasons as for paddy land - for security and loans. Soil fertility improves yields, and ecological balance is important to provide natural insect control.

Home gardens

The people also sought land titles for their home gardens. They wish to use their home garden land for the same functions as in the past, play areas for children, conversations, and growing a kitchen garden. They seek to grow a diversity of vegetables and other plants - one of the villages specified that they do not want to use this land for commercially grown herbs, as some leaders are proposing, as they don't want non-native plants to displace native plants here. They need family labour to maintain their home gardens.

Cattle owners

Cattle owners' vision (mentioned in one village only) was to retain, or regain, common property use of fields in the dry season, since they have been displaced from the use of rice fields in the dry season owing to the growing of irrigated second crops.

Ecology, water resources and forests

The overall ecological vision is for the Mae Pan environment to have a similar ecological balance to that in the past, because the reliability of water supply depends on the headwater forest.

The vision for water is to continue their traditional irrigation system (muang fai), succeeding in distributing water equitably so that all members have sufficient water for their production needs. The vision also includes being equitable in the use of labour for maintaining the system and avoiding the need for heavy labour in repairs because of the rising cost of labour. Repairs are also impeded by lack of materials, as villagers are not allowed to take wood from the forests. One of the villages would like government assistance with infrastructure, by assisting with the funding and building of weirs and canals (villagers seek participation in the design). Lastly, the vision is for a clean water supply from the mountain. They would like to resolve competition for water arising from tourist facilities drawing water from the Mae Pan waterfall. One of the villages said it would prefer to stop the tourist facilities drawing water from this source, and if this was not possible, to have a timetable for each to draw water.

The forestry vision is to use forest products without conflict with the RFD. The people do not want to destroy the forest surrounding their village. They want power to manage the classes of forest they conserve under their traditional system - protected headwater and ceremony forests - with support from the government for this.

Government agencies

Inthanon National Park

The National Park official interviewed explained his main vision (or his aims) as to achieve the objective of maintaining and protecting the national park. In doing this, he did not want conflict with villagers, nor to see deforestation. He would like a clear demarcation between government-managed and villagers' forests in order to solve conflicts. He identified a mutual interest opportunity, in a vision to assist villagers to gain income from tourism, and have the State earn tourism income too. His logic was that income from tourism would mean villagers would not need to destroy forest, and the government would have a useful income stream.

Agricultural promotion

The agricultural promotion official's vision - a statement of policy - was a straightforward one, to assist the villagers to achieve high yield production, to reduce villagers' expansion into forests.

Business sector

The contract farming middle-men's vision is to support villagers in obtaining their means of production, as this creates their own source of cash income. They would also like to see good forests, but forest protection is not in their line of business. (In practice their promotion of fertiliser and pesticide use is detrimental to forests.)

CONFLICTS

There is internal inconsistency among the villagers' visions. The visions, and also the resource information drawn from village interviews, show a nostalgia for the distant past (over 30 years ago), when land was available for the taking, water abundant and clean, and there was a healthy subcatchment ecosystem based on complementarity between forest and farm. At the same time the people seek success in their commercial farming, which has required land expansion, makes heavy use of water particularly in the dry season, and requires practices detrimental to the ecosystem. There appear to be some tensions between stakeholders within the villages, for instance the cattle farmers who are deprived of common property grazing rights in the dry season, by the paddy field owners who grow second crops. Whereas in the distant past a fluid system of land possession and use, incorporating common property rights to grazing, water and forests, is recalled as working well, there is now strong demand for land titles in all categories of land - paddy, upland fields and for the house. This reflects severe insecurity about the risk of losing land, as well as commercial factors.

Underlying conflict between the National Park and villagers is reflected in some of the resource information and visions statements. The impact of tourism on water quantity and quality is evident, both because tourist facilities draw off water, and because of tourist behaviour in the water. There are clearly boundary disputes between villagers and the park. There is a risk of conflict in the allocation of water resources, since there is clearly an allocation problem caused by reduced natural water flows (assumed by all parties to be related to reduced forest cover) and the demands of commercial agriculture.

While the history of agricultural and environmental change related for the subcatchment makes only indirect reference to population growth, this is clearly a major reason for land pressures and environmental change. The combination of population growth - apparently largely due to in -migration - and commercialisation of agriculture, has been threatening to the environment, to the point that the farmers are struggling. Their awareness of ecosystem breakdown is most interesting in this context.

BASES FOR COOPERATION

National park

The visions presented on behalf of the national park reflect a willingness for cooperation, and a desire to reduce existing conflicts. Local officials of the Royal Forestry Department (and perhaps all departments) can be caught between their departments' policies, and personal sympathies based on local knowledge. (There is reputed to be great diversity among the attitudes

of local forestry officials). By seeking clear demarcation between the Park and villagers forests, this representative recognises the existence of a dual system of government and villager-managed forests.

At one level, villagers are in agreement with the Park official in not wanting to see (further) deforestation. On another level, if there is uncertainty about boundaries the commercially-oriented villagers' desires for farm land could continue to place pressures on both the government and community forests.

On their different lands, both officials and villagers are involved in forest conservation. This suggests potential for direct cooperation in the future.

Villagers made no comment on the commercial ideas for tourism - they may not have spotted, or be interested in such an opportunity. Their current view of tourism appears negative, because of the impact on water resources.

Agriculture

There appears complete accord between these villagers' interests in commercial agriculture, and that of the agricultural extension official. A proportion of villagers also support the rider, to prevent expansion of agriculture into forests.

The issue of water resources, clearly a problem to villagers in this subcatchment, could well be promoted as a basis for common interest between villagers and government. Government is highly concerned about the downstream effects of highland deforestation and water use, as the water allocation strains evident in this subcatchment are mirrored at other scales further down the Ping and Chao Phraya catchments. Lowland Thai of the plains around Chiangmai are inclined to blame highlanders - particularly the ethnic minorities - for their water resources problems, and until the last two to three years government policy was inclined to follow the perspective that lowland Thai people's needs were paramount. (This should change under the new Constitution, and the proposed Community Forestry Bill). Evidence is needed for the belief that water quantity is closely related to forest cover - this may be broadly the case but the relationship is unlikely to be uniform. If common interest is established in the need to maintain a certain proportion of forest cover for water resources (and other ecological requirements noted by the farmers), the implication is that the extent of irrigation, and commercial agricultural production, requires some limitation. This runs counter to some departments', and agribusinesses', enthusiastic promotion of commercial agriculture for the dual aims of assisting villager incomes and (in the case of the ethnic minorities) environmental well-being. Since soil quality is deteriorating (and poor land used) to the point of farm incomes suffering badly, a rethink of the promotion of commercial agriculture appears necessary.

CONCLUSION FOR BOTH CATCHMENTS

There is in-principle potential for cooperation, and perhaps co-management, on certain fronts, but much relationship-building would be necessary to make this possible. Trust would be a necessary part of these relationships. Villagers need to be able to control their members sufficiently to earn government departments' trust that they will not damage resources in their charge - this requires strong community bonds, which may for all we know be undermined by the individualisation arising from the transformation of the farming system and land ownership. On the whole, it appears more practical for villages to control their members, than for

governments to invest the funds necessary for patrolling. Government - as a whole and through each of its departments - needs to earn villagers' trust also, starting with policies which are congruent with rather than antagonistic towards highland residents' interests (a strong start has been made with the new Constitution and Community Forestry Bill), and continuing through to local practice including the management of corruption within the government system and face-to-face relationships between local personnel and villagers.

Acknowledgments

This research is part of a joint Thai-Australian project, Integrated Water Resources Assessment and Management Framework, funded by the Australian Centre for International Agricultural Research and the Royal Thai Government. The authors thank the field team who conducted interviews village meetings, Dr Chayan Watanabhuti of the Centre for Ethnic and Social Development, Chiangmai University, Andrew Walker of the Australian National University for his comments on drafts, and Scot Barme for translation work.

References

Anan Ganjanapan1992 'Community forestry in northern Thailand: learning from local practices'. In Wood, H. and Mellink, W.H.H. (eds) Sustainable and effective management system for community forestry. Bangkok: FAO/RECOFTC.

Hinton, P. 1975. Karen subsistence: the limits of a swidden economy in north Thailand. PhD thesis, University of Sydney.

Jakeman A.J. Ross H. and Wong F. 1997. 'Integrated water resource assessment and management for sustainable resource management in northern Thailand' Advancing integrated resource management: processes and policies. Proceedings of the second national workshop on integrated catchment management, River Basin Management Society, Canberra, 29 September -1 October.

Kesmanee,C. 1988. Resettlement Policy: Way Out in Cycle Mountain. Social Science Journal of Chiang Mai University. Pp.66-102

Kunstadter, P., Chapman E.C. and Sanga Sabhasri 1978. Farmers in the forest: economic development and marginal agriculture in northern Thailand. Honolulu: University of Hawaii Press.

Kunstadter, P. and Kunstadter, S. 1992 'Population movements and environmental changes in the hills of northern Thailand.' In G. Wijewardene and E.C. Chapman (eds) Patterns and illusions: Thai history and thought. Singapore: Institute of Southeast Asian Studies.

McKinnon, J. 1987 'Prejudice, ideology, science and technology in Highland policy formation'. In McKinnon, J. and Vienne, B. eds.Hill Tribes today: problems in development. Bangkok: White Lotus.

Pasuk Phongpaichit and Baker, C. 1995 Thailand: economy and politics. Kuala Lumpur: Oxford University Press.

Prathuang Narintarangkul na Ayuthaya 1997. 'Community forestry and watershed networks' in P. Hirsch (ed) Seeing the forests for trees: political economy of Thailand's environment Chiangmai: Silkworm Books.

Ross H. Narintarangkul na Ayuthaya P. and Wong F. 1997. 'Integrating socio-cultural with economic and environmental issues in a river basin: A case study of the upper Chao Phraya headwaters, Northern Thailand'. Proceedings of MODSIM 97 International Congress on Modelling and Simulation, Hobart 8-11 December.

Vandergeest, P. 1996 'Mapping nature: territorialisation of forest rights in Thailand'. Society and Natural Resources 9, 159-175.