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Facilitating Better Linkages Between Hill-Tribe Communities and Government Agencies with Digitized Land Use Maps in Mae Hong Son Province, Thailand

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ABSTRACT

Digitized land use maps at village and sub-district level are shown as a tool for land use planning in the project areas of the Thai-German Highland Development Program (TG-HDP) in Mae Hong Son province. There are conflicting interests between the nearly 1 million hill tribe people in northern Thailand and the government, which has decreed that their settlement areas are forest reserves, according to which they are neither allowed to settle in these areas nor use forest resources for subsistence. Yet hill tribe communities have practiced their various forms of shifting cultivation for centuries in a sustainable way and it is important to have their types of land management accepted by the central government, so as to soften the top-down land use planning approach into one that is more participatory.

Hand-drawn village land use maps can be digitized and printed in various sizes for information sharing and joint planning with the various stakeholders. Hill tribe farming systems demarcate about twice as much land area for conservation forest as for agricultural use and by displaying their adaptation towards intensified land use, they clearly show that their efforts at conserving forest lie well within the 40% target set by the Royal Forest Department (RFD). Of this agricultural area, only about 10% is actually burned and cultivated every year, while the rest is in various stages of forest regeneration through fallow. In the current move towards government decentralization and policy reformulation, the newly forming Tambon (or sub-district) Administrative Organizations (TAO) can create lines of communication between villagers and government agencies.

INTRODUCTION

The forests in the northern highlands of Thailand are one of the largest remaining forest resources of the country and serve as the main watershed areas for the Chao Phaya basin, which is the country's most fertile and valuable farming land. The north of Thailand has experienced rapid changes in land use, driven by internal forces like population growth as well as commercial agriculture, and external forces related to government policy such as nationalization (Thai identity), enforcement of forest and watershed conservation, suppression of opium production, and improved infrastructure. This is accompanied by a progressive integration of highlanders of different ethnic origin into mainstream Thai society. In the past, these very extensive farming systems were well adapted to highland conditions, when population density was low and available land for shifting cultivation was still abundant in the forest. During the last 40 years, however, the hill tribe population in northern Thailand has increased fivefold from 217,000 in 1960 (Kunstadter et al., 1978) to 1 million in 2000 (or 1.6% of the national population), yet the national population has also increased from 26 million to 62 million over the same period (ADB, 2000). Parallel to this, the country has experienced a drastic disappearance of forest cover this century, as it is estimated that at the turn of the century 75% of the land was forested (McKinnon, 1997), decreasing to 60% in 1938 and 53% in 1961 (RFD, 1993). The decline further continued to 26% in 1991 and pessimistic figures place it as low as 15% (Maxwell, 1997). As a result of this increase, more marginal forest is encroached upon, fallow periods are decreasing, and forest degradation is a threat (Schmidt-Vogt, 1998).

As a reaction to rapid deforestation, a watershed classification formulated in 1983 (still in force) placed most of the highlands in watershed class 1A, according to which no settlement or agricultural activities were permitted under the mandate of the Royal Forest Department (Tangtham, 1992), rendering hill tribe livelihoods illegal in an attempt by the government to take control of forest areas (Ganjanapan, 1998). This was followed by the first national forest policy in 1985, which formulated forest target figures of 40%, of which 15% were conservation forest and 25% production forest, and any land with a slope of 35% or more was declared forestland, for which no title deed or land use certificates can be issued. The forest target figures were reversed in 1987, with more emphasis placed on conservation, and all commercial logging was banned in 1989 (Pragtong, 1993). Apart from forestry, later policies led to the First Master Plan for Highland Development and Narcotic Crops Control (1992-1996), as well as a Second one (1997-2001), with a focus on the socio-economic improvement of hill tribes, settlement in permanent villages, community organization and environmental conservation (RTG, 1997). The most recent policy is the Tambon Council (TC) and Tambon Administrative Organization (TAO) Act (sub-district in Thai) under the Ministry of Interior (MOI) and effective from March 1995 (Puntasen, 1997). The aim is the propagation of democracy at grass-roots level by organizing villages into Tambons with elected village leaders and mandates for local government functions.

The plethora of policies and subsequent highland development projects, which peaked with a total of 168 agencies in the late 1980s (Ganjanapan, 1997), has led to a situation whereby hill tribes are caught between three

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divergent policies regarding forest settlement and farming:

- The restoration of forest cover to 25% conservation and 15% production forest, enforced by the watershed classification that makes most highland areas off-limits, under the mandate of the Royal Forest Department (RFD), to the point that even hill tribe resettlement by force was considered (Arbhabhirama et al., 1987).
- The registration of hill tribe villages with boundaries by the Department of Local Administration (DOLA) under the Ministry of Interior, classified by population and long-term residence, progressing from satellite village with no official status to key village with recognized village leaders (Aguettant, 1996), and Thai nationality.
- The classification of highland communities according to permanent agricultural potential carried out by the Department of Land Development (RTG, 1997), though without coordination with RFD regarding the watershed classification as well as without the inclusion of hill tribe land classifications.

The highlands of northern Thailand are thus a prime example for a conflict between a centralized government system with divergent priorities of forest preservation and integration of ethnic minorities that extends its control to the remote areas, where traditional shifting cultivation clashes with centralized planning – an ideal case study for land use planning.

Research Areas and Project Aim

Among the various highland development projects with foreign assistance, the TG-HDP operated the longest, with 17 years of project activities till it closed in September 1998. A part of this regional rural development project was the conservation of natural resources. This embraced full participation of the hill tribe communities through the concept of "Community based land use planning and local watershed management" (CLM) initiated in 1990 in 7 villages and which has spread to 30 villages in Mae Hong Son province by 1998 (van Eckert, 1993; Anonymous, 1998). The goal was an improved sustainable use of land, water and forests, a rehabilitation of watershed areas and an intensified agricultural production on suitable land. Furthermore, outer user boundaries were demarcated beyond which no activities are permitted, and these were to be used as village boundaries upon official village registration with DOLA. Planning strongly relied on three-dimensional topographic models to identify and demarcate the following land categories on a scale of 1:5000:

- Village and housing area including home gardens
- Arable land for annual crops and pasture areas
- Arable land for perennial crops and agroforestry
- Social and community forest land
- Watershed areas and conservation forest

The TG-HDP has concentrated the CLM approach in Pang Ma Pha district, inhabited by Shan, Karen, Black Lahu, Red Lahu and Lisu, and Huai Poo Ling sub-district inhabited by Karen. Prior to the introduction of CLM, the TG-HDP also operated in Chiang Rai as summarized below (see Diagram 1):

- Wawi in Chiang Rai Province; first selected area in 1981 and concluded in 1994.
- Nam Lang in Mae Hong Son Province; second project

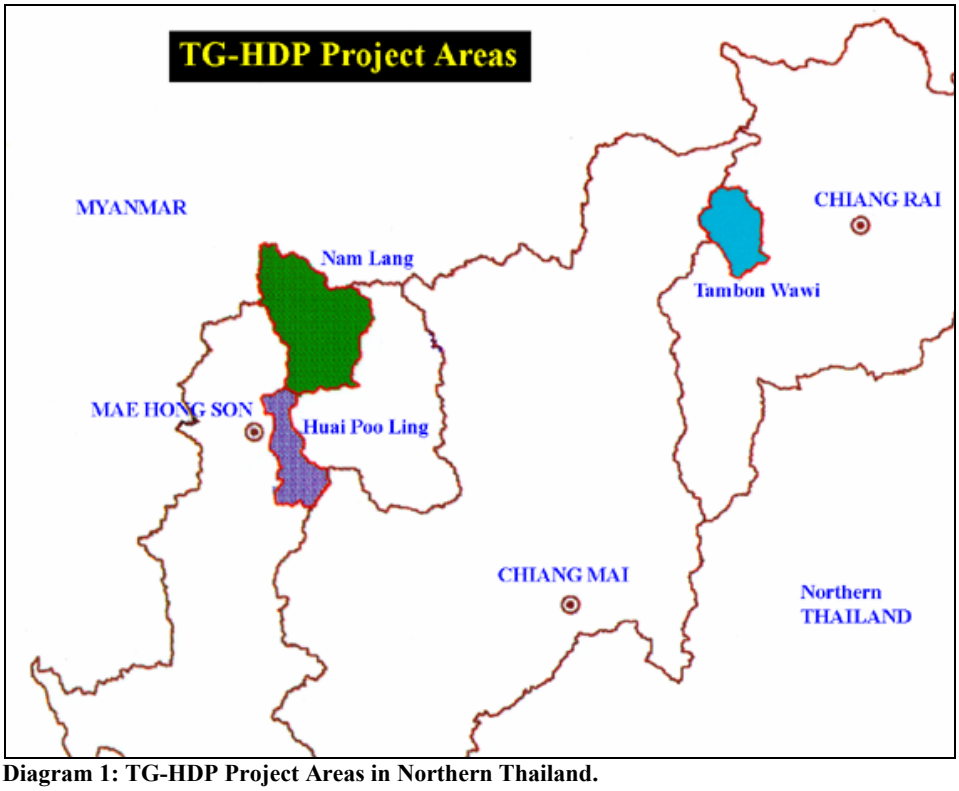

Diagram 1: TG-HDP Project Areas in Northern Thailand.

area started in 1983, named after the watershed and renamed Pang Ma Pha when it was upgraded to a district in 1996.

- Huai Poo Ling sub-district in Mae Hong Son Province; third project area started in 1990.

It is against this background of development work that the accompanying research project was initiated to develop a method to combine Land Use Planning with remote sensing tools, with the full integration and participation of the local communities in order to maintain natural resources and to safeguard sustainable, ecological farming systems.

The work was focused on the two project areas of Nam Lang (Pang Ma Pha District) and Huai Poo Ling Sub-District. The entire project area lies in Watershed Class 1A (no forest use or settlement), and within it all land has been classified as conservation forest by the Royal Forest Department. The southern 60% of Nam Lang lies in the Pai Wildlife Sanctuary. Both areas are dominated by mixed deciduous forest, with smaller patches of hill evergreen forest in between. In both areas, the soil parent material is limestone, sandstone and volcanic rocks, which developed into sandy loam, clay loam and clay soils of shallow to intermediate depth. The altitude ranges from 300 to 1,700 m, and the mean annual temperature is 24°C. The annual rainfall average is 1,300 mm in both areas. Pang Ma Pha contains 600 km^2, and is almost twice as large as the 370 km^2 Huai Poo Ling area. Nam Lang has also experienced a strong population increase from 6,000 in 1983 to 16,000 inhabitants in 1998. In terms of population density, this is an increase from 10 persons/km^2 to 27 persons/km^2. The population density in Tambon Huai Poo Ling has changed from 6 persons/km^2 to 10 persons/km^2 from 1990 to 1998, or from 2,500 inhabitants to now 3,500 inhabitants. This population increase undoubtedly affects the environment, particularly forest cover and agricultural areas.

The traditional agricultural systems of highlanders of different ethnic origins are based on shifting cultivation, with upland rice and maize on sloping land and paddy rice in the valleys. Poppy and extensive livestock production meet the farmers' cash demands. However, these systems and settlement structures differ, due to ethnic origin and cultural background. The two main types of shifting cultivation will be used as an example from the two project areas covered by the TG-HDP, namely **Pioneer Swiddening** in Nam Lang, as practiced by Lahu and Lisu hill-tribes, and **Rotational Swiddening** of the Karen in Huai Poo Ling (Table 1).

Research Methodology

In order to go beyond land demarcation and to carry the planning process up from village level to higher planning, the research project examined possibilities to enter the data from village maps into a Geographic Information System (GIS), so as to provide visual information that is understandable by the people who displayed it. There are several challenges when combining participatory approaches and GIS (Abbot et al., 1998):

- Scaling up to show local concerns as well as broad regional or national perspectives, so that local priorities can be integrated into regional plans.
- The access of local people to decision making power through the ownership and use of data, since in the past this access was limited to a few high-level decision makers and thus constituted a merely extractive extension tool.
- A land use model or GIS turns local knowledge into public knowledge and out of local control, and can be used to locate resources or extract more taxes.

While 6 villages were surveyed with questionnaires and semi-structured interviews, for this paper results are shown only for a sample village of each farming system. A map at sub-district is also presented. The selection criteria consisted of representation of both farming systems, location in a same micro-watershed, and an interest among villagers to cooperate.

Hand-drawn land use maps were collected in all 10 CLM target villages of Huai Poo Ling and in three villages in Pang Ma Pha, as only three villages had transferred their land use models onto maps. For Pang Ma Pha it was thus not possible to aggregate the maps to sub-district level. The village maps were digitized using a hand digitizer into the GIS program ArcInfo and then converted into maps using the map-drawing program ArcView 3. Contour lines were obtained from the Remote Sensing Center of Chiang Mai University (CMU) to give a three-dimensional perspective, with 20 m

Table 1: Traditional of Pioneer and Rotational Swiddening Systems.

Pioneer Swiddening	Rotational Swiddening
Altitude 800-2,000 m, limestone soils and practiced by Hmong, Yao, Akha, Lahu, Lisu.	Altitude 700-1,600 m, red clay or lateritic soils and practiced by Karen as well as Lua.
After burning, a field is cultivated for 4-5 years till declining soil fertility or too much secondary growth. Farmers move on to look for new areas and grass fields are abandoned.	After burning, an area is cultivated for 1 year only and left to fallow for 6-15 years to rejuvenate before farmers return, a cyclical pattern ensuring rich biodiversity.
Trees are cut and uprooted, deep hoe cultivation and clean weeding, tree regrowth not possible and fields covered by *Imperata.*	Trees are cut at breast height, but not uprooted, to allow regrowth, mulching, fodder and seed production, there is no hoeing.
Rice only is grown in the rainy season followed by opium, crop rotation.	Mixed cropping of rice with vegetables and cash crops, but no opium cultivation.
Very scattered fields, when abandoning an area the whole village moves to new place.	Joint cultivation of larger field clusters and permanent settlement in an area.

elevation intervals for the village maps and 100 m intervals at Sub-District level. The roads and streams, as well as the boundaries for Huai Poo Ling were obtained from the Survey section of the Northern Narcotics Control Office (NNCO) in digitized form and overlaid with the remaining data. The different land categories were then color-coded using the same colors as were used on village maps. Maps were presented using the Universal Transverse Mercator (UTM) co-ordinates as reference points in area increments of 1 km² for village maps and 5 km² for the Sub-District map. The area figures for different land categories were obtained by adding the corresponding polygons. The aggregated map at sub-district level often showed overlapping forest areas.

After the maps were digitized and printed, they were taken back to villages for modifications or corrections, so they could later be distributed in plastified A1 size to villages for longer-term use. With the closure of the TG-HDP it is likely that the models will not be updated and will disintegrate over time, and the hand drawn maps may suffer the same fate. Maps were also distributed to district forest officials to facilitate their work in land use monitoring. All the data and the GIS software were then transferred to the Survey Section of NNCO, and to the ICRAF office in Chiang Mai. Since ICRAF currently collects highland land use data for all of northern Thailand, it may be the most appropriate institution to use such information to create the link between the forest preservation policy of RFD and the sustainable forest use of the highland population (Saipothong et al., 1999).

RESULTS AND DISCUSSION

Huai Hea Village (Tambon Pang Ma Pha)

The Lahu Sheleh village of Huai Hea was established as a local settlement 50 years ago and most settlers came originally from the Sam Muen mountains in Chiang Dao district, Chiang Mai province, while some migrated from Doi Khu in Myanmar (Burma). The main reason for their migration was to seek fertile land for planting opium. Huai Hea is 26 km north towards the Burmese border and is furthest away from Pang Ma Pha town. The population of Huai Hea is just over 200, or 10 people/km². The village was registered with DOLA in 1987 as *key village* No. 8, although the Department of Land Development (DLD) classified it as class 3, as a village without potential for permanent settlement (DLD, 1994). This contradicting status continues to cause insecurity among villagers about their livelihood.

Huai Hea covers an area of 2,103 ha with an outer user boundary marked by villagers themselves, though this boundary is not officially recognized (Diagram 2). About 67% is marked as forest area, while about 33%, or 693 ha, are used for agricultural purposes. The village clearly lies within the national target of 40% forest and has set up strict rules for the preservation of its environment. It is the only surveyed village in Pang Ma Pha that has paddy rice, and this land is the most valued. Crops grown include maize and

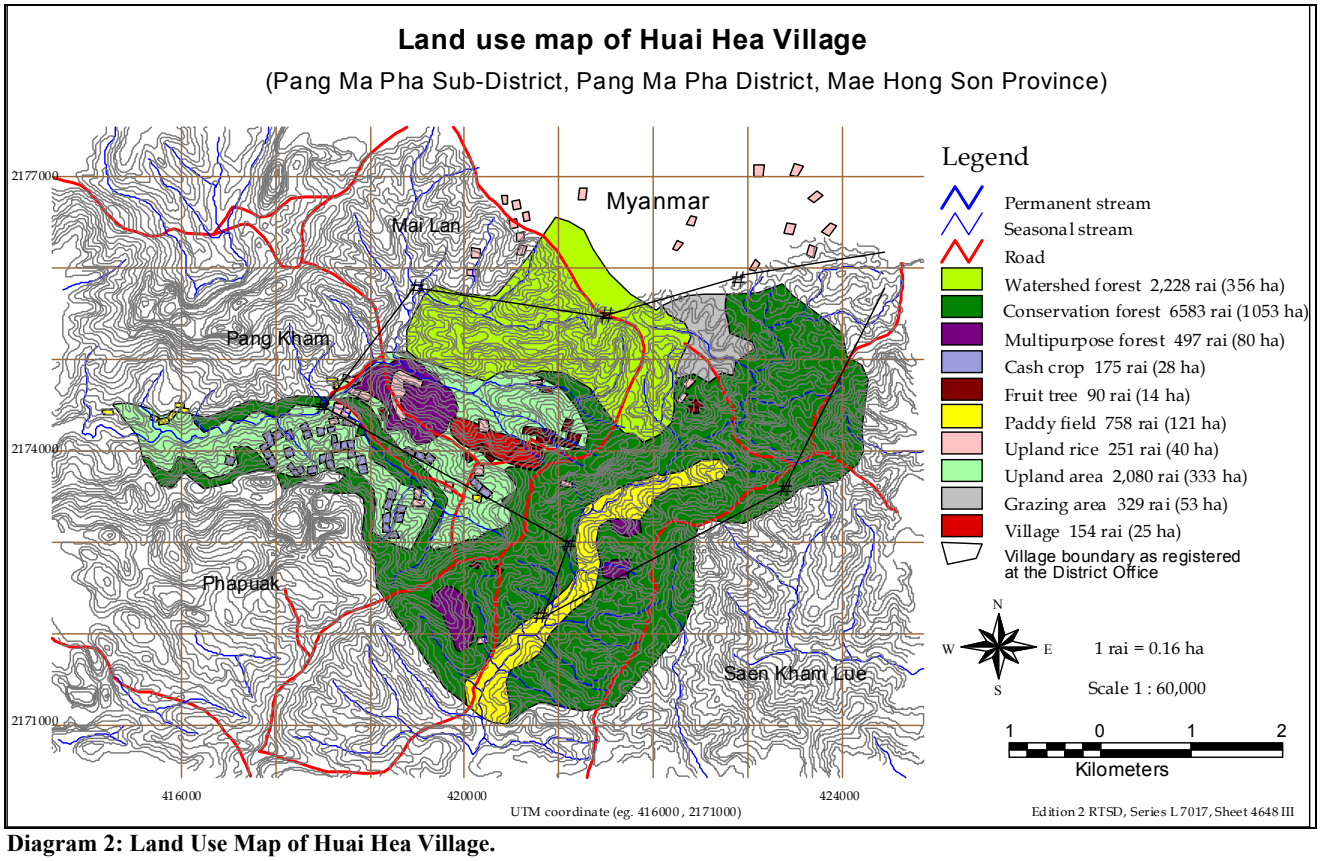

Diagram 2: Land Use Map of Huai Hea Village.

red beans in crop rotations, as well as vegetables and fruit trees. Villagers have 2-6 fields on average, ranging from 1-2 ha, and those who migrated from Burma still cross the border to farm there to make ends meet. Since the inclusion of Huai Hea in the CLM concept 1994, farmers have reduced their number of **pioneer swiddening** plots which previously exceeded 10, and the fallow periods for upland rice have decreased from 7-8 years to 2-3 years, while lands in Burma will progressively be given up as land use intensifies.

When interviewed about the use of their model and the map, villagers responded that the TG-HDP provided it, yet that the Forest Department which owns the land by law, does not recognize their land use demarcations and may alter them at any time. A land use conflict with the newly established neighboring village of Phapuak to the west was also mentioned, where Huai Hea lost some upland when Pa Puak was officially registered in April 1995 (DOLA, 1995). Phapuak villagers originated in Huai Hea and migrated to form a new settlement. The members of the Tambon Administrative Organization (TAO) that has been in existence for four years do not yet normally use maps for meetings, partly because of their limited map interpretation skills and the lack of official recognition of land demarcations by the government. Several farmers reported that the RFD, which does not recognize the village model, confiscated uplands, and they fear of losing more land now that the TG-HDP has left the area and villagers have to deal with authorities directly.

Huai Tong Village Tambon Huai Poo Ling)

Huai Tong is a Karen village over 100 years old and has grown from a population of 150 in 1964 (year of registration as *key village* No. 5) to 480 people with 112 households. Farmers still practice **rotational swiddening**, but due to its location in a valley, paddy fields have become established a long time ago. Paddy rice is thus the most important source of livelihood, while upland rice supplements the diet. Other crops are taro, red beans, maize, cabbage, and a wide selection of fruit trees. The village boundary was demarcated in 1996 with the arrival of the CLM program, yet it does not correspond to the boundary that was drawn when its former satellite village Huai Poo Loei was registered as a key village (DOLA, 1995), so that for official purposes the land to the west does not belong to Huai Tong anymore (Diagram 3).

The village area demarcated by farmers is 1,988 ha, of which 1,345 ha, or 67 %, are forest, while 644 ha are used for agriculture (33%). The mapped area on the model does not cover the whole village and the researcher has tried several times to use farmers to update the missing areas, but there was little interest in doing so given the threat of RFD land confiscation. They also possess minimal mapping skills, showing that the CLM approach has not been embraced at village level yet. Some farmers still have land in neighboring Chiang Mai province to the east and face the risk of losing it once boundaries are strictly enforced.

As population density increases, crop rotations in the upland are decreasing from 10-15 years to 8-12 years.

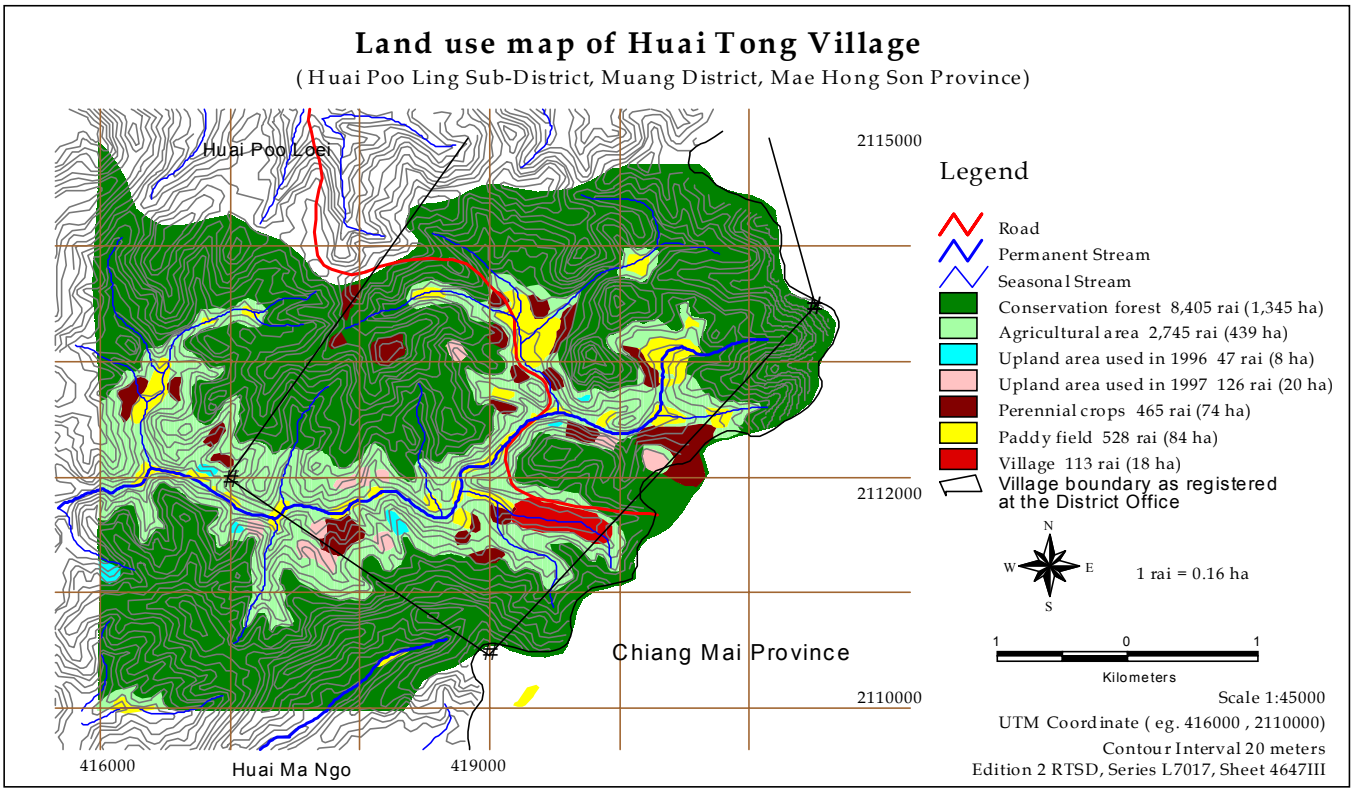

Diagram 3: Land Use Map of Huai Tong Village.

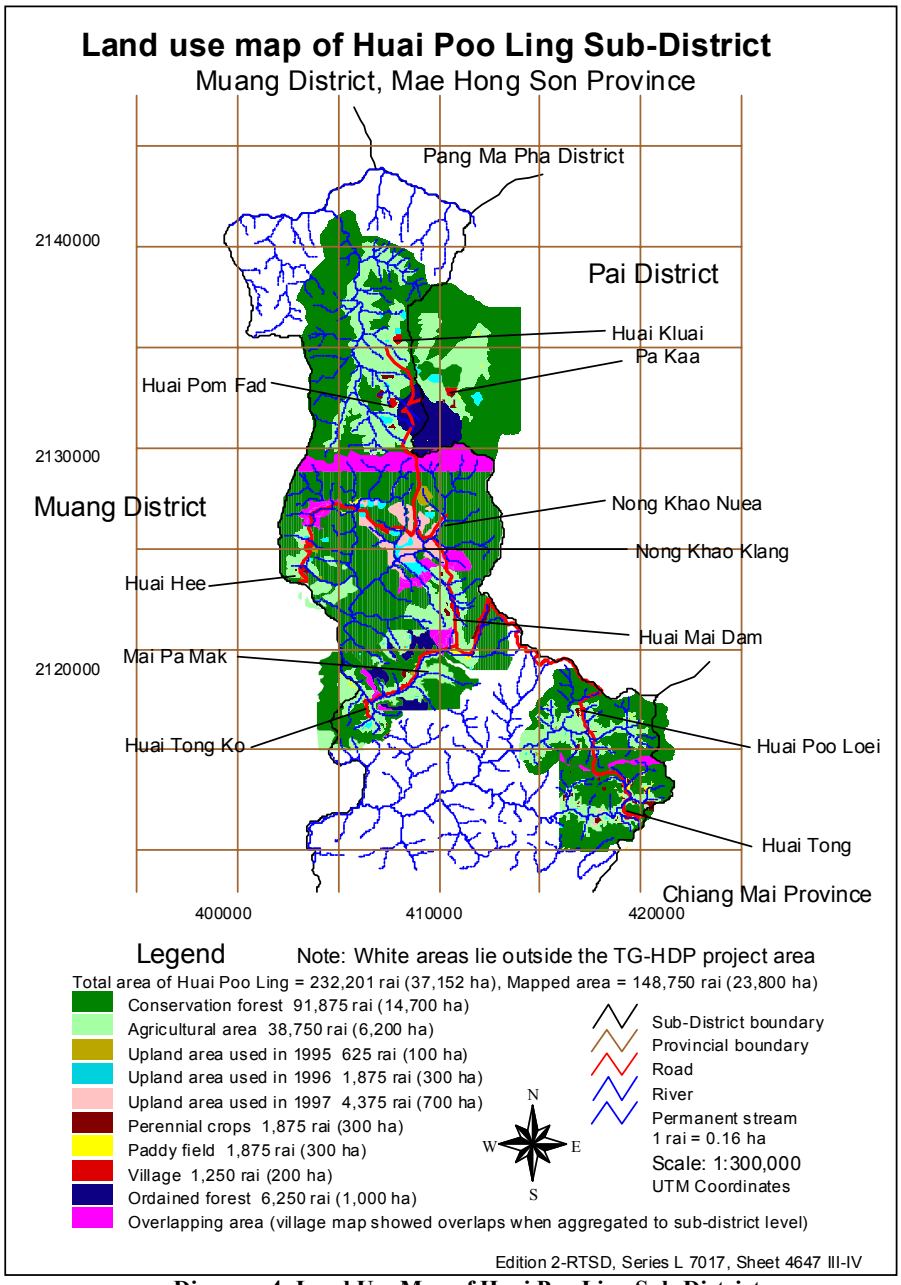

Diagram 4: Land Use Map of Huai Poo Ling Sub-District.

Table 2: Comparison of TG-HDP Land Use Categories for Huai Poo Ling with own data.

Land use type	TG-HDP figure	% of total	Own calculation	% of total
Total Tambon area	37,152 ha		37,152 ha	
1. Conservation forest	28,434 ha	76.4%	14,700 ha	39.6%
1.1. Ordained forest	not mapped		1,000 ha	2.7%
2. Total agricultural area:	7,686 ha	20.7%	7,600 ha	20.5%
of which used in 1995	190 ha	2.5%	100 ha	1.3%
of which used in 1996	202 ha	2.6%	300 ha	3.9%
of which used in 1997	201 ha	2.6%	700 ha	9.2%
2.1. Perennial crops	106 ha	1.4%	300 ha	3.9%
2.2. Paddy fields	184 ha	2.4%	300 ha	3.9%
3. Village	150 ha	0.4%	200 ha	0.5%

Villagers own 2-5 fields ranging from 0.3-4 ha, and almost all households have paddy land. The RFD has started to conduct a detailed survey of plot sizes and villagers fear they may lose land with the new policy of the Mae Hong Son Governor, who only allows for 2 year fallows on uplands to reduce the total cultivation area. Additionally, only 2 upland fields are permitted and tree breast diameters of more than 10 cm in fallow areas can be confiscated by RFD as permanent forest areas. One strategy in response to the threat of losing land by villagers is to plant hedgerows between fallow areas in order to show to RFD officials that the land is being used. It seems almost ironic that farmers have to resort to such tactics to keep their land, but in this uncertain situation of an insecure *land deal* (whereby intensive permanent farming replaces extensive shifting cultivation in the hope to thereby achieve land security), this is what villagers resort to in order to keep their basis for a livelihood.

Aggregation at Sub-District level

In the project area of **Huai Poo Ling** the ten village maps were aggregated to a sub-district map (Diagram 4), and the white areas indicate villages that lie outside the TG-HDP project area. The contour lines and rivers, however, have been included for the whole sub-district. It is interesting to note that the village of Pa Kaa lies outside the sub-district boundary (in neighboring Pai district). There presently are no reliable maps from the Royal Survey Department indicating sub-district boundaries, and work is in progress to produce this data. But even more important is the fact that there are overlapping areas claimed by adjacent villages (marked in pink), which may lead to conflicting claims over its use. In most cases this land lies in conservation forest areas, which means that the total forest area claimed by each village is actually less when aggregated to sub-district level. Village maps can thus be deceiving when they are examined from a higher level, as can be seen when aggregated GIS land use data is compared to manual measurements by the TG-HDP staff (Table 2). The greatest difference between figures is the area demarcated as conservation forest, possibly because the TG-HDP has marked all the white areas outside the project area as forest, in spite of the fact that there are villages in these areas. The figures for total agricultural area are more similar, and this land use category makes up some 20% of the whole sub-district area. The area for perennial crops and paddy fields also is more alike between manual and GIS calculations, which if added to agricultural land brings the figure of used land to 25%. This still leaves 75% forest area for conservation, which is well in line with the official national target of 40%. According to my own calculations the area cultivated each year is increasing from 1.3% in 1995 to 9.2% in 1997, a rather sharp increase that needs to be verified. As far as forest policy is concerned, it is fair to say that the rotational swiddening system in transition as practiced by the Karen is sustainable and deserves official acceptance by the Royal Forest Department (RFD) as an example that people and forests can co-exist.

CONCLUSION

The implications of mapping are far-reaching, both in terms of **technical data** such as forest cover and land use, as well as in terms of **policy** with the current decentralization. The area figures are not meant to give complete information, but they show that, particularly in the sensitive highlands inhabited by people who are blamed for forest destruction, the situation is not critical and highlanders do indeed manage their resources sustainably. Forests are preserved while highlanders are gradually moving towards permanent farming, and the figure of 40% conservation forest at sub-district level by far exceeds the national goal of 15%. Cross-checking maps with villagers shows that sometimes agricultural areas lie outside the ones marked on models or maps. Map updating still is a difficult process, as the mapping skills of TAO representatives are limited, yet they are the ones who in cooperation with extension staff from the government, are in the best position to update them. At present digitized maps still have only a limited usefulness given the inaccuracy of village maps and poor interpretation skills by village representatives.

The process of participatory mapping and planning is gaining acceptance by development agencies in Thailand, though not yet in terms of **policy** as the hotly debated Community Forestry Act shows, which has been discussed since 1991 without conclusion (Amornsanguansin, 1992). In an effort to update forest policy, a Forestry Sector Master Plan was developed with international assistance in 1993, yet it was never implemented (Jantakad and Gilmour, 1999). The recent revocation of three resolutions passed in April 1997 granting settlement in forest areas occupied prior to 1993, shows the uncertainty as to whether participatory land use planning really has a chance in Thailand. Even though the political backup for this process is still missing, various organizations are working with participatory mapping and planning approaches at different levels. The furthest steps have been taken by the NGO, CARE, in its Integrated Natural Resources Conservation Project in Mae Chaem district of Chiang Mai (Prasithiboon, 1998). In target areas, Village Forest Conservation and Watershed Management Committees are established, with government representatives and village leaders as members, and district officials countersign land use agreements as a guarantee to agreed land management. To date this is the only case known where written documents signed by both parties exist, and these have given highland farmers the necessary confidence that the government endorses their land management systems.

As farmers have taken important steps by openly displaying their modified land management in transition to permanent farming, it is now up to the government authorities to continue this process and to produce computerized maps for joint land use planning with the keepers of the forest. Maps are essential for natural resource management planning, and it is possible to link bottom-up approaches with technology, as can be seen by the fact that the maps produced for this paper were used by the Tambon Administrative Council (TAO) representatives at provincial level in Mae Hong Son in a petition that was submitted to

the Parliament for the recognition of highland farming systems in 1998. The procedure described herein could be used as a method should this participatory process become firmly established, but even more important than the technical infrastructure, is the political will to plan with the hill tribes.

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REFERENCES

Abbot, J., R. Chambers, C. Dunn, T. Harris, E. de Merode, G. Porter, J. Townsend and D. Weiner. 1998. Participatory GIS: opportunity or oxymoron? In: PLA notes 33, International Institute for Environment and Development (IIED), London, pp. 27-34

ADB. 2000. Addressing the Health and Education needs of Ethnic Minorities in the Greater Mekong Sub-Region. Asian Development Bank (ADB), Thailand Country Report, Research Triangle Institute (RTI), Chiang Mai

Aguettant, J.L. 1996. Impact of Population Registration on Hill Tribe Development in Thailand. Asia-Pacific Population Journal, Vol. 11, NO. 4, pp. 47-72

Amornsanguansin, J. 1992. Thailand Forest Policy and Extension. In: Local Organisations in Community Forestry Extension in Asia. FAO Field Document No. 34, Bangkok

Anonymous. 1998. Review of TG-HDP's Agricultural and Forestry Programmes, 1984-1998, vol. 1 and 2. Thai-German Highland Development Programme (TG-HDP), Chiang Mai, Internal Paper Nr. 212

Arbhabhirama, A., D. Phantumvanit, J. Elkington and P. Ingkasuwan. 1987. Thailand Natural Resources Profile. Is the Resource Base for Thailand's Development Sustainable? Thailand Development Research Institute (TDRI), Bangkok

DLD. 1994. Land Development Book for the Highlands, Mae Hong Son Province. Department of Land Development, Bangkok (in Thai).

DOLA. 1995. Village registration and area demarcation. Department of Local Administration, Office of the Governor, Mae Hong Son Province, 27 April (in Thai)

van Eckert, M. 1993. Findings of the Review of the Community Based Land Use Planning and Local Watershed Management Process and Recommendations, TG-HDP Internal Paper No. 171

Ganjanapan, A. 1997. The politics of environment in northern Thailand: Ethnicity and highland development programs. In: Hirsch (Ed.), P. 1997. Seeing Forests for Trees: Environment and environmentalism in Thailand. Silkworm Books, Chiang Mai, pp. 202-222

Ganjapapan, A. 1998. The politics of conservation and the complexity of local control of forests in the northern Thai highlands. Mountain Research and Development, Vol. 18, No. 1, pp. 71-82

Jantakad, P. and D. Gilmour. 1999. Forest rehabilitation and practice in Thailand. Proceedings of the workshop on the "Rehabilitation of degraded forest ecosystems in the lower Mekong basin: assessments of rehabilitation policy and practice in Thailand". 24-25 November, Chiang Mai, pp. 75-113

Kunstadter, P., E.C. Chapman and S. Sabhasri. 1978. Farmers in the Forest. Economic Development and Marginal Agriculture in Northern Thailand. University Press of Hawaii, Honolulu

McKinnon, J. 1997. The forests of Thailand: Strike up the ban? In: McCaskill, D., and K. Kampe (Eds.). 1997. Development or Domestication? Indigenous peoples of Southeast Asia. Silkworm Books, Chiang Mai, pp. 117-131

Maxwell, J.F. 1997. Brief History of Northern Thai Forests: Present and Future. Presentation at the Informal Northern Thai Group meeting on 8 April 1997, Alliance Française, Chiang Mai

Pragtong, K. 1993. Institutional and administrative aspects of forest policy implementation in Thailand. In: Policy and Legislation in Common Forests, RECOFTC Report No. 11, Bangkok, pp. 115-119

Prasithiboon, A. 1998. CARE-Thailand's Integrated Natural Resource Conservation Project. Paper presented at the "International Workshop on Community Based Natural Resource Management Experiences" in Chiang Mai, organised by the TG-HDP, 1-5 June

Puntasen, A. 1997. The Tambon Council and community forest management. In: Hirsch (Ed.), P. 1997. Seeing Forests for Trees: Environment and environmentalism in Thailand. Silkworm Books, Chiang Mai, pp. 72-88

RFD. 1993. Thai Forestry Sector Master Plan (TFSMP), vol. 1-7. Royal Forest Department, Bangkok

RTG. 1997. Second Master Plan for Highland Development and Narcotic Crops Control. Bangkok (in Thai)

Saipothong, P., H. Weyerhäuser and D. Thomas. 1999. Potential of GIS for Local Land Use Planning: a Case Study in Mae Chaem, Northern Thailand. International Centre for Research in Agroforestry (ICRAF), Chiang Mai University

Schmidt-Vogt, D. 1998. Defining Degradation: The Impacts of Swidden on Forests in Northern Thailand. Mountain Research and Development, Vol. 18, No. 2, pp. 135-149

Tangtham, N. 1992. Principles and application of watershed classification in Thailand. Paper presented at the Training Course on Natural Resource Management and Conservation in Watershed Areas, 7.9.- 11.12, Asian Institute of Technology, Bangkok.