ACTA UNIVERSITATIS AGRICULTURAE SUECIAE

SILVESTRIA 178


# Sustainable Use of Forest Land in Southeast Asia

## -A strategic planning approach

Mats Sandewall

SWEDISH UNIVERSITY OF AGRICULTURAL SCIENCES

# Sustainable Use of Forest Land in Southeast Asia
## - A strategic planning approach

Mats Sandewall

Akademisk avhandling som för vinnande av skoglig doktorsexamen kommer att offentligt försvaras i Hörsal Björken, SLU i Umeå, fredagen den 20:e april, 2001, kl. 13.00.

## Abstract

Forest land in tropical areas is being used for many forestry and non-forestry purposes by a number of stakeholders based upon their needs, rather than according to the official land use status.

An inter-disciplinary approach on strategic forest land-use planning was developed in two case studies in Laos and Vietnam. It outlines how governments in tropical countries could interact with local stakeholders to promote a land use that is sustainable both for the society at large and for the individuals. The approach, that links government based and farm based planning, emphasises the need to consider historical developments and accurately assess the current situation when elaborating land use strategies. The capture and analysis of the forestry, agriculture and socio-economic data and information is based upon internally supportive methods from the natural and social sciences (e.g. sampling, remote sensing, participatory rural appraisal, use of official sources, a simulation model and stakeholder dialogues).

A feasible method for estimation of actual land use "field point sampling with local key informants" was developed. It integrates local knowledge (e.g. on land use history, tenure, market) and controlled area sampling.

A planning tool, the Area Production Model was used for elaborating scenarios based on historical information, e.g. land use, economic growth, forest cover, population, and agriculture production and consumption. In order to explain forest and land use dynamics (and model deforestation) in shifting cultivation areas, it was necessary to apply a gross area concept, i.a. both cultivated land and fallow must be considered as agriculture land.

There were significant discrepancies between the data used in official planning and the actual situation as estimated by field point sampling. Areas officially classified as "not yet used land" or forest land were actually used for food production. With reference to the Vietnamese Five Million Hectares Reforestation Programme, the study concluded that such "harmonised" (negotiated) data is not feasible for use in strategic planning.

*Key words*: area production, data capture, multi disciplinary, point sampling, policy.

Distribution:
Swedish University of Agricultural Sciences
Department of Forest Resource Management and Geomatics
SE-901 83 Umeå

Umeå 2001
ISSN 1401-6230
ISBN 91-576-6062-X

# Sustainable Use of Forest Land in Southeast Asia

## -A strategic planning approach

Mats Sandewall
*Department of Forest Resource Management and Geomatics*
*Umeå*

**Doctoral thesis**
**Swedish University of Agricultural Sciences**
**Umeå 2001**

**Acta Universitatis Agriculturae Sueciae**
Silvestria 178

ISSN 1401-6230
ISBN 91-576-6062-X

Printed by: SLU, Grafiska Enheten, Umeå, Sweden, 2001

# Abstract

Sandewall, M. 2001. *Sustainable use of forest land in Southeast Asia – a strategic planning approach.* Doctoral dissertation. ISSN 1401-6230, ISBN 91-576-6062-X

Forest land in tropical areas is being used for many forestry and non-forestry purposes by a number of stakeholders based upon their needs, rather than according to the official land use status.

An inter-disciplinary approach on strategic forest land-use planning was developed in two case studies in Laos and Vietnam. It outlines how governments in tropical countries could interact with local stakeholders to promote a land use that is sustainable both for the society at large and for the individuals. The approach, that links government based and farm based planning, emphasises the need to consider historical developments and accurately assess the current situation when elaborating land use strategies. The capture and analysis of the forestry, agriculture and socio-economic data and information is based upon internally supportive methods from the natural and social sciences (e.g. sampling, remote sensing, participatory rural appraisal, use of official sources, a simulation model and stakeholder dialogues).

A feasible method for estimation of actual land use "field point sampling with local key informants" was developed. It integrates local knowledge (e.g. on land use history, tenure, market) and controlled area sampling.

A planning tool, the Area Production Model was used for elaborating scenarios based on historical information, e.g. land use, economic growth, forest cover, population, and agriculture production and consumption. In order to explain forest and land use dynamics (and model deforestation) in shifting cultivation areas, it was necessary to apply a gross area concept, i.a. both cultivated land and fallow must be considered as agriculture land.

There were significant discrepancies between the data used in official planning and the actual situation as estimated by field point sampling. Areas officially classified as "not yet used land" or forest land were actually used for food production. With reference to the Vietnamese Five Million Hectares Reforestation Programme, the study concluded that such "harmonised" (negotiated) data is not feasible for use in strategic planning.

*Key words*: area production, data capture, multi disciplinary, point sampling, policy.

*Author's address:* Swedish University of Agricultural Sciences (SLU), Department of Forest Resource Management and Geomatics, SE - 901 83 Umeå.

# Contents

# Appendix

## Papers I-IV

The thesis is based on the following papers, referred to by the corresponding numerals in the text:

I: Sandewall, M., Ohlsson, B. and Sawathvong, S. 2001. Assessment of historical land use changes for purposes of strategic planning - a case study in Laos. *Ambio* ***30***, 55-61.

II: Sandewall, M. and Nilsson, N-E. 2001. The Area Production Model - a tool and concept for sustainable land-use and forest resource development. Accepted for publication by the Journal of Environmental Management.

III: Sandewall, M. 2001. Capture of land use data for strategic planning - a point sampling approach based on local people's knowledge. Manuscript.

IV: Ohlsson, B, Sandewall, M., Sandewall, R.K. and Phon, N.H. 2001. Government plans and farmers intentions - a study on forest land use planning in Vietnam. Submitted manuscript.

Papers I and II are reproduced with the consent of the publishers.

# Introduction

Governments plan but people do. This thesis, which is focused on two tropical developing countries in Southeast Asia, concerns the issue of how society (mainly local people and their governments) use and try to manage land and forest through consumption and production of goods and services.

With an emphasis on "strategic planning" (Bryson, 1999, Mintzberg, 1994) the study outlines ideas on how authorities in tropical countries could act versus local people to promote a land use, that is sustainable both for the society at large and for the individuals.

A point of departure for the study is that forest and other land is and will be used for many purposes by different stakeholders based upon their needs and expectations, rather than according to the official status of the land. The statement is illustrated by the following brief land-use review, which is based upon official statistics. The main purpose of the review is to highlight some significant components in land use and put the two studied countries, Lao PDR and Vietnam, in an international perspective.

Photo 1: Temporarily unstocked forest land .....or cultural landscape ?

## The land use issue

*Forests and forestry*

About 30% of the land area in developed and also in so called developing countries is covered by forest (Table1). In average, the citizen in the developing region has much less forest area at his/her disposal and the net deforestation rate is higher, about 0.5% per annum.

Shortage of forest products among poor people is not the major cause of deforestation though. Persson (1995) estimates that logging may directly cause some 10% of all tropical deforestation. Indirectly, it is however a more important factor. In a systematic review of research articles, logging was cited as a cause of deforestation in 45% and fuel wood demand in 20% of the articles (Rudel et al, 2000).

Forest plantations are established for satisfying industrial requirements, fuel wood demands, needs for household products, soil protection and other reasons (Pandey, 1996). Plantation is rarely successful unless there is a market for the product or a strong need (Köhlin and Oswald, 2001). Suitable land, secure tenure and availability of funds for investment and maintenance are other conditions for successful plantation programmes (FAO, 1999).

Forests are used for many other purposes than timber. Non timber forest products represent an important part of the income of local people in tropical forest areas (Byron and Arnold, 1999). Its role in soil and water protection and for improving existing agriculture systems is of direct economic importance locally. As a gene-bank, for carbon storage, research and so on it has regional and global significance (UN, 1993b; FAO, 1999). One of the most common uses of the forest land is agriculture production.

About 10% of the worlds "closed forests" (crown density exceeding 40%) have been granted some formal protection. However, efforts by governments to protect forests, e.g. for bio-diversity conservation or watershed protection will only succeed when the users conclude that protection is the more beneficial than clearing the land (Singh et al. 2001).

Table 1. Some data on forest, land use and society, year 2000 (FAO, 1999; 2001a; 2001b)

| Item | Developed Regions | Developing regions | Lao PDR | Vietnam |
|---|---|---|---|---|
| Total land area, Mha | 5 187 | 7 861 | 23 | 33 |
| Forest, Mha (percent of land area) | 1 722 (33%) | 2 139 (28%) | 12.6 (54%) | 9.8 (30%) |
| Closed forest, Mha (percent of land area) | 1 698 (33%) | 1 661 (21%) | 11.5 (50%) | 7.3 (22%) |
| Annual net change of forest, 1990s, Mha (%) | 1.4 (+0.1 ) | - 10.4 (-0.5) | - 0.05 (-0.4) | +0.05 (+1.6) |
| Forest plantation area, Mha | 63.8 | 112.3 | 0.05 | 1.7 |
| Annual forest planting rate, 1990s, Mha | n.a. | + 4.3 | + 0.006 | + 0.080 |
| Population, total, millions | 1 312 | 4 666 | 5.3 | 78.7 |
| Population density, persons per km2 | 25 | 59 | 23 | 242 |
| Forest per capita, ha | 1.31 | 0.46 | 2.4 | 0.12 |
| Agriculture crop land, Mha (% of land area) | 0.67 (12%) | 0.78 (10%) | 0.08 (3.5%) | 7.0 (21%) |
| Agriculture crop land per capita, ha | 0.58 | 0.19 | 0.16 | 0.10 |
| GDP per capita, USD (1997) | 13 362 | 763 | 414 | 299 |

*Agriculture*

The majority of the people in developing countries are farmers. Although, the proportion of crop land is not much different, the average citizen in developing countries has far less crop land as compared to developed countries. Poor farmers in the tropics seldom have the resources to fully compensate land shortage by increased agriculture productivity. Conversion of forest into land for agriculture (crops and grazing) is an important direct cause of deforestation. The indirect causes are complex and linked to such issues as policies in relation to market and economic growth, population growth and other socio-economic factors (Persson, 1995; Contreras-Hermosilla, 2000).

Shifting cultivation (or swidden-based agriculture), practised by some 300 Million people in tropical mountain areas (Roder, 1997), includes a range of management systems and forms of produce (Dove, 1983). The term involves an alteration between a cropping period and a fallow period when the soil is rested (Ruthenberg, 1980). It is often practised by people without tenure rights and seldom authorised by governments who tend to disregard this land use or underestimate its extent (McElwee, 1999). In Laos and Vietnam, figures for shifting cultivation are disguised as "temporarily unstocked areas" and "not yet used land". In both countries, the land used for shifting cultivation is classified as forest land, although it is mostly used for production of subsistence food, animals or market crops.

*Socio-economic situation*

During 1880-1999 the population density in continental Southeast Asia increased from about 10 to 106 persons per km2 (Flint, 1994; FAO, 1999). Although the growth has influenced the land use, it is not necessarily a problem of resource shortage. People, whether rich or poor, are indeed consumers but also producers. When expansion to forest areas is not an option, increased need for food and other necessities forces people to use resources and land more intensively (Boserup, 1965). Efforts to increase the agriculture land productivity by additional labour input, cultivation of permanent crops, fertilisation and irrigation are examples of that.

There is an enormous gap in income (and thereby the level of agricultural and industrial production and consumption) between developed and developing countries (Table 1). Market economy, a strategy offered by Southeast Asian governments in the 1980s and 90s, has been followed by an accelerated economic growth, but also by an increased income gap between rich and poor (Fan and Fan, 2000; Shari, 2000). Mostly, rural mountain areas are lagging far behind plains and urban areas (Donovan et al, 1997). Shifting cultivation, common in the mountains, forces many people to live scattered and remote from infrastructure, markets, services and new ideas. Investing in e.g. cash crops is an option when there is a stable market for the products and if there are savings for investments. Poor people rarely have savings.

Allocation of land tenure rights to individuals is another strategy being implemented (Howard, 1998). The assumption is that people without such rights, being uncertain how long they can stay, do not put faith in long-

term investments. The program of allocating forest land for agriculture use to local farmers is not always embraced by them, as it is often connected with tax payment. Women and men sometimes have different roles and attitudes towards changes. Women could e.g. be more interested to abandon shifting cultivation in favour of permanent cropping as they do the hardest work (Fernandes and Menon, 1987, Sodarak, 2000). The outcome of a strategy or a program depends on who is addressed.

## The planning issue

Governments in tropical countries are under domestic political pressure to deal with land use and socio-economics problems, such as environmental depletion, shortage of resources, inequality, poverty and diseases. Being part of an international community, they are also subject to external pressure through for example trade barriers and conditional development aid. Heavy foreign debts often accentuate the pressure. Most countries (represented by their governments) take part in international processes, e.g. the United Nations Conference on Environment and Development (UN, 1993a; 1993b) and the Tropical (National) Forestry Action Plan (Clement, 1995; Savenije, 2000), and make commitments and sign conventions on environmental and economic issues (Anon, 2000).

The tools used by governments to influence land use and development include policies, strategies, legislation, taxes and subsidies, development programmes and other means. Often, these means form an integrated part of a planning system, also including strategic planning.

Strategic planning, "a disciplined effort to produce decisions and actions that shape what an organisation is, what it does and why" (Bryson, 1999) aims at elaborating and analysing strategies for how to approach various issues. It is based upon an accurate description of the current situation and goals for development (see also figure 2). Such planning is mainly a matter of creating conditions that enable desired changes to take place. For many reasons formal strategic planning in relation to tropical forest land use has often been hampered by shortcomings.

1. The multi-sectored scope of land-use planning has not been reflected in practice. When foresters are involved, they sometimes focus on timber and forest cover but disregard other sectors' needs. Institutional structures have not promoted data analysis for strategic purposes.

2. Formal land use planning has been centralised and often donor driven. It has not been dynamic or based on a good knowledge of previous and current land use, tenure issues or production and consumption of goods and services. Historical aspects have often been neglected. For farmers, their previous experience is the base for most management decisions.

3. Data capture is time consuming and expensive. In the tropics, approaches on data collection, e.g. national forest inventories, have generated new data, but often been project oriented rather than problem oriented and not always adapted to guide strategic decisions.

In western countries simulation models and scenario techniques are used to support planning and analyse the foreseeable future consequences of optional management strategies (Nabuurs and Paivinen, 1996). Various stakeholder groups are often well organised and participate in the decision making. The use in Sweden of the HUGIN-system, a simulation model focused on forestry requirements and the use of the forestland is one example (Nilsson, 1986; National Board of Forestry, 2000).

There are also a number of models developed for various purposes in tropical regions (Constanza et al., 1993, Kaimowitz and Angelsen, 1998). Their use in the planning and policy process in different countries is, however, so far not much developed. Major reasons could be that this process often functions differently from the West and that data capture is not adapted to suit the purpose of strategic planning.

In Laos, for example, forest related data have been collected on national level in several nation-wide inventories based on remote sensing or field sampling. Agriculture, demographic and socio-economic data have been captured through different censuses. Unfortunately, the data are not co-ordinated in time and space in such way that they can sufficiently explain development in relation to policies and strategies.

In addition, negotiated "harmonised" data are collected (in Laos, Vietnam and many other countries). Every village in the country report upward on socio-economic and agricultural achievements in relation to centrally distributed targets. A mass of data is generated, and it is useful for some purposes, e.g. taxation and budgeting, but not for situations where accurate estimates of the current situation and changes are needed (Government of Vietnam, 2000). The tradition is sometimes to use data to justify decided strategies rather than as a base for continuously improving them.

## The studied countries

*Lao P.D.R.*

In the regional perspective of Southeast Asia, the Lao People's Democratic Republic is a low-income country with fairly much forest. The forest cover proportion of 54% refers to the FAO standards (land with at least 10% crown coverage). This definition has not been widely used in Laos. One reason is that many agriculture fields in Laos have a tree growth with a crown coverage exceeding 10% (Manivong and Sandewall, 1992). The estimated crop area (Table 1) is based upon official reporting. About 30% of that area represent upland agriculture i.e. shifting cultivation. The figure does not include fallow land (Government of Lao PDR. 2000).

During the 1990s the Lao Government has emphasised sustainable land-use development (including reduction of shifting cultivation, environmental protection and commercial forestry (e.g. plantation programs) in its political process. A forest law has been adopted, a strategy to allocate forest land tenure rights to farmers and other stakeholders is being implemented nation-wide and large forest areas have been set aside for conservation. At the same time there has been increased market economic and infrastructure development (logging, hydropower, roads, urban areas) which has increased the pressure on the natural resources. Population growth is still high, about 2.5% per annum, and only a few have benefited from the economic growth. People's socio-economic conditions and environmental changes have come in focus (Sawathvong, 2000).

*Vietnam*

Vietnam and Laos are both considered being among the world's poorest countries. In Vietnam, the former substantial forest area has diminished fast as a result of rapid socio-economic changes and spontaneous and government promoted migration. The population density is very high - as an average over 200 persons per km2 (50-100 persons in rural mountain areas). In terms of education system and skilled people, Vietnam is comparably well off. The Government has emphasised market economy, socio-economic, land-use and environmental issues in policies and development programs (Government of Vietnam, 1996; 1998). Significant socio-economic achievements have been made but not so much in the mountain areas (Donovan et al, 1997).

Vietnam has, over the years, established the most extensive forest plantation areas in the Region (next to China and India) within the frames of government supported reforestation programmes (Lung, 1999). The current ambition is not only to balance the current deforestation rate of 100-200 thousand hectares per annum (Poffenberger and Phon, 1998), but also to recover the forest lost since the 1940s.

## Objectives of the Study

The general objective of the study was to develop approaches and methods that could improve the sustainable use of forest and forest land in tropical developing countries.

The specific objectives of the case studies were:

- Develop a research approach that combines local knowledge with scientific verifiable methods and describe and analyse the actual land use development in a defined area over a historical period (Paper I)

- Test and analyse the applicability of an existing simulation model and planning tool by using consolidated historical data and information (Paper II).

- Develop and test a feasible method for capture and analysis of data and information, which accurately describes the current land use situation (Paper III).

- Develop and apply methods for critically analysing the current planning procedures in a commune based upon a comparison of the actual land use situation on one hand and official plans on the other (Paper IV).

- Evaluate and discuss the requirements and planning procedures for a national reforestation programme based upon the findings of the above mentioned analysis and experiences of a large-scale forest industry program (Paper IV).

# Study areas and research methods

## Study Areas

Case studies were undertaken in the Upper Nam Nan Water Catchment Area, Luang Prabang Province, Lao PDR and in Ban Lau Commune, Lao Cai Province, Vietnam (Figure 1).

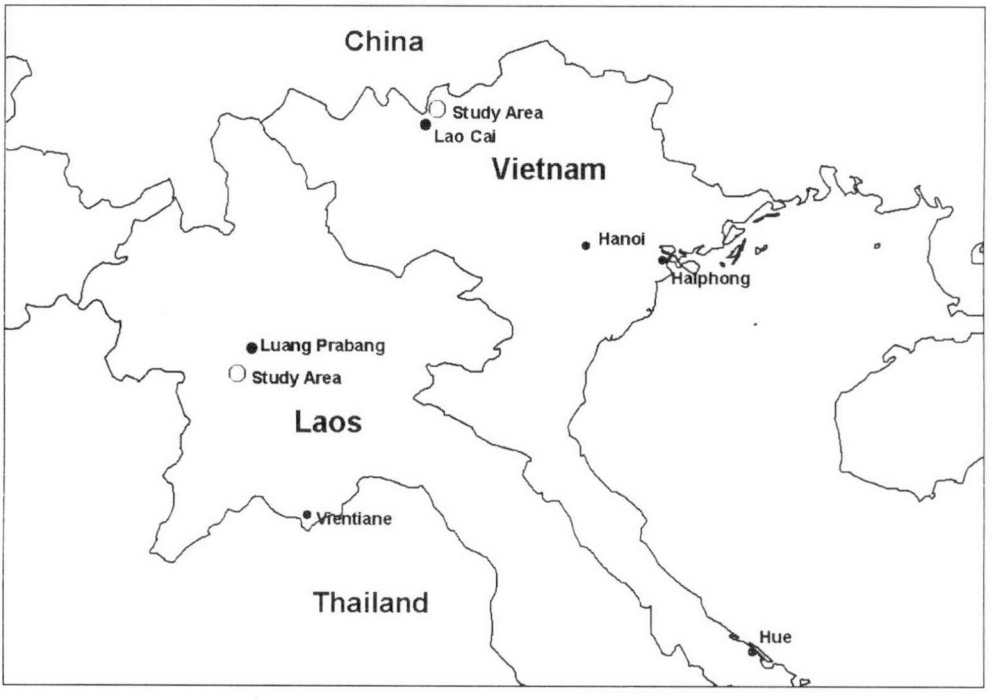


Figure 1. The location of the two study areas in Laos and Vietnam.

The Lao study area covered 9200 ha and a population of 2600 people in seven villages, including the main ethnic categories of the country, Lao Loum, Lao Theung and Lao Soung (Souvanthong, 1995). Over 90% of the population in this mountainous area practice rotational shifting cultivation for subsistence. The area was chosen for being fairly typical of Northern Laos in terms of land use and natural conditions, for being a watershed with natural boundaries and having a good infrastructure for research (such as a nearby research station and recently produced aerial photography).

The Vietnamese study area is a hilly commune in Lao Cai Province, along the border with China. There were 4400 persons from 10 different ethnic groups in 21 villages on 5400 ha. The choice of Ban Lau Commune was

based on similarities with the Lao area in terms of natural conditions and land use, although population pressure is much higher. Other important reasons were the presence of a diversified land use and impact of a number of government strategies, such as land allocation, land use planning, resettlement, reforestation program and mountain area development (Government of Vietnam, 1996).

## Research team

The formation of a multidisciplinary research team was an important part of the research approach. The Swedish team consisted of a forester, a sociologist and an agronomist. During data capture and analysis the team worked jointly in various constellations and together with their Lao and Vietnamese partners depending on situation and needs.

In Laos, the research co-operation partners were offices and projects under the Forestry Department. The main partners were the Shifting Cultivation Research Project, Luang Prabang who provided research assistants (a forester, an agronomist, a gender officer and a local village researcher), the Forest Inventory and Planning Centre, Vientiane, who provided photo interpretation officers and the Lao-ADB Forest Plantation Project.
In Vietnam, the main co-operation partner was the Forest Inventory and Planning Institute, who provided a team of research officers.

## Research approach

Forest land tends to be used for agriculture and many other purposes besides forestry based on social and economic reasons (UN 1993b). Thus, an inter-disciplinary approach was chosen for the study (Table 2).

Qualitative data and information can have strong explanatory power and is often needed for obtaining deep understanding of a situation. Quantitative data is needed for obtaining an overview in time and space, and thus much used in planning. By combining the two, the generality of the qualitative data could be assessed and process explanations of quantitative data be obtained. (Duncan, 2000).

The idea of the Study was to combine methods based on social and natural science in the process of identifying events and developments, which can be used to describe and understand forest land use and its changes.

Table 2. The scope of the project and the main sources of information and data (Ohlsson and Sandewall, 1997)

| Sphere | Comments | Sources of data and information |
|---|---|---|
| Physical situation | Refers to actual land use, such as extent of shifting cultivation over time, forest cover and agriculture yield. | Satellite and aerial photos covering a historical period. Field inventory. Other research. |
| Economic situation | Refers to integration and contact with the market and the national economy, infrastructure and so on. | Province, district and village based information. |
| Socio-economic situation | Household livelihood including strategies and actual land use over time. | Village based information, other studies |
| Policies, strategies and legal framework | Refers to information on the national, province and district level over time | Government documents, other reports and research |

By analysing historical developments and dynamics, including the current situation, a platform was established for elaborating on the future. A planning and analysis tool, the Area Production Model (Nilsson, 1982), was tested for the purpose of developing scenarios on future land use. To examine if the model was realistic, it was initially applied on verified historical data (Paper I).

To certify that planning does not only reflect factual changes, but also people's perception of ongoing changes and their ambitions for the future, all major stake-holders need to be involved in a planning process. Therefore, inter-action with and among the various stakeholders was an important part of the project approach. In the study, tentative results were presented to the villagers in a seminar and during re-visits to each village for obtaining of feed-back, discussing how various events interact and also discussing land use options. This approach allowed the villagers and the government staff to ask questions and raise additional issues.

## Data capture and analysis

A *historical and socio-economic survey* was an important research component. It was based upon an inter-active process of open-ended interviews with selected villagers (elders, headmen, women and sampled households). Participatory Rural Appraisal, PRA (Admassie, 1995; Rocheleau, 1994) was used together with conventional interviews (Paper I and IV). The interviews covered demographic data and information about agricultural, political and socio-economic conditions and changes. After crosscheck with other sources and field visits, a tentative historical record was presented and discussed among villagers and officials.

*Field point sampling with local key informants* was a method developed with the objective to estimate the actual situation, changes and its causes (Paper III). It was based upon a systematic grid of sampling points, covering the area of study, that were allocated on maps, photos or along transects. The method combined systematic point sampling and local experience by engaging senior local informants to provide information on past (certain years), present and expected future land use on each sampling point, and could generate a systematic and complete record of land use changes. To provide data on the official land status, a local officer was included in the team. Classification was made when the "planner" and the "informants" jointly visited each sampling point. The distance between the plots was set in order to achieve results with an acceptable statistical error. Information on current land use was verified by observation on the spot. Historical data were occasionally verified using satellite images or aerial photos of those years. Recording was done so that additional comments and information could be added (e.g. reasons for changes).

*Aerial photos and satellite images* were used for validation in the field of villagers' and other stakeholders' land use data (Paper I). In Laos, the location of each field sampling point was also identified on old photos with subsequent visual interpretation indoors. As a result, a verified record of land use and forest cover changes over 45 years was obtained. In addition, a method for multi-temporal analysis of land use changes following scanning, rectification and digitising of land use types was developed.

*Available external sources of information and data* were used in combination with village based information. Those sources included official statistics based on reporting systems, data on official policies and

legislation, population census data on projected growth, other research on crop yields and official land use plans.

There are numerous potential errors in data based on memory, verbal information and in measurement. Through *cross verification*, data obtained from the different methods were validated and misunderstandings reduced.

*The Area Production Model, APM,* was developed by Nils-Erik Nilsson as a strategic planning tool (Nilsson, 1982; Lindgren, 1986; Grylle, 1997). It was used in the study as a framework for data capture and, following the development of land use scenarios, for data analysis (Paper II).

The APM is a transparent simulation model and could be seen as a "calculator" which generates the relevant questions rather than provides answers. Technically it is a Windows-based computer program, which enables generalised simulation of future land use changes (scenarios) for periods from 5-50 years. The APM includes all land within a defined geographical area. The aim with the model is to cover (as far as possible) all goods and services produced and consumed. In practice the scenarios includes production and consumption of goods and some services in agriculture and forestry (crops, timber, household energy).

The main input data to be provided for a simulation concerns the current land use and forest conditions, and in addition, assumptions on changes in population, income, agriculture productivity and energy demand. APM consists of four main components.

- The first component describes the distribution of the land on different land use categories and the agriculture production. People's needs for agriculture crops and market products in combination with the land productivity determine the area needed for agriculture. The land that is not needed for agriculture is available for forest and other production.

- The second part describes the production and consumption of biomass energy. People's estimated need for fuel is balanced with the production of forestry and agriculture by-products, so called auto-production. The balance determines the need to establish fuel wood plantations, reduce energy consumption through new techniques and so on.

- A third component includes conditions and changes in the natural forest. It is based on broad estimates of growth and extraction of wood.

- The fourth component covers development of forest plantations based on growth, extraction, annual planting area, thinning regimes and so on.

The set of data to be provided could be used as a framework for data collection. The end purpose is to use it as a tool for analysing and discussing optional strategies as a base for decisions (strategic planning).

In a typical APM simulation on future development, growth factors and management programs are modified until the outcome (scenario) is judged to be realistic or acceptable by stakeholders involved. (To be able to judge what could be realistic, it is preferable to initially test the model on historical consolidated data). In the simulation, the assigned growth factors (e.g. population growth) represent the changes required to achieve a certain scenario. The question for the manager is - what are the optional means to achieve those changes (family planning, migration, providing jobs etc)?

*Stakeholder interaction and dissemination* had a significant role in the research. Besides the PRAs and follow-up visits, there were stakeholder seminars or "village dialogues" by the end of each research session. Some reports (e.g. village history) were translated into the local languages and discussed with each village. For testing a complete planning approach based on experiences of the research, a three-week long planning workshop for representatives of both countries and involving different sectors and stake-holder groups was carried out (Anon, 1999)

# Results and discussion

## Summary of findings in the studies

The thesis consists of four papers of which paper I and IV are case studies while paper II and III describe some planning tools tested and developed in the study.

*Paper I*

An inter-disciplinary research approach was developed and applied in a case study undertaken in a water catchment area in Laos.

When studying land use in a historical perspective, including population changes, market, agriculture methods, forestry activity, wars, government policy and socio-economic situation, all those factors were found to have influenced forest land use.

Both the government and the farmers had influenced the land use situation. As an example, some 38 % of all migration over 100 years had taken place on the farmers own initiative, while 62% had been caused by external factors, e.g. policy and insecurity.

In order to explain forest and land use dynamics in areas with shifting cultivation, it was necessary to apply a gross area concept (considering both cultivated areas and active fallow as being used for agriculture).

In some areas, crop production in shifting cultivation had been comparably sustainable, even at short cycles. Since 1953, the total population in the study area had increased 300 % while the gross area used for shifting cultivation had increased 35 %, meaning that the fallow cycle had been dramatically reduced. Many fields had been cultivated for about 50 years on a rotational basis without dramatic changes in crop yields.

*Paper II*

The paper summarises the idea, structure and current status of the Area Production Model (APM), originally developed in the 1980s. A test of the APM using the actual historical development in the Lao study area as input showed that APM operated realistically when a gross area concept was used for shifting cultivation.

Some pieces were missing or not well reflected in the model. Over-lapping land use other than "auto-production" (e.g. grazing and animal husbandry, collection of non-wood forest produce and agro-forestry systems were such components). The labour factor was not included.

In planning situations, APM was found to promote inter-action between surveyors and decision-makers by requiring the former to collect and analyse multi-sectored data and providing the latter with a better insight in matters of data requirements. It also directed attention in planning towards data of special importance and it emphasised the value of analysing past and current situation and ongoing changes as a base for strategic decisions.

*Paper III*

Paper III introduces "field point sampling" as a participatory method for collecting data and information on the current land use that could be used in strategic planning.

Comparative analysis of data from field sampling and photo interpretation showed that for specific years land use data given by key-informants were not precise but the trend over a series of years gave important information.

The field point sampling addressed many shortcomings that have been faced in existing methods for land use data collection, such as national forest inventories. It enabled integration of socio-economic data and local peoples' experience and it facilitated the raising of new issues. It assessed land use and tenure, considered historical changes, and was robust and fairly simple. The time between fieldwork and output of results was short. Some disadvantages were that it required good map-reading skills (not always available), that historical data were sometimes difficult to verify and that information provided by key-informants living outside the area (sometimes inevitable) could be uncertain.

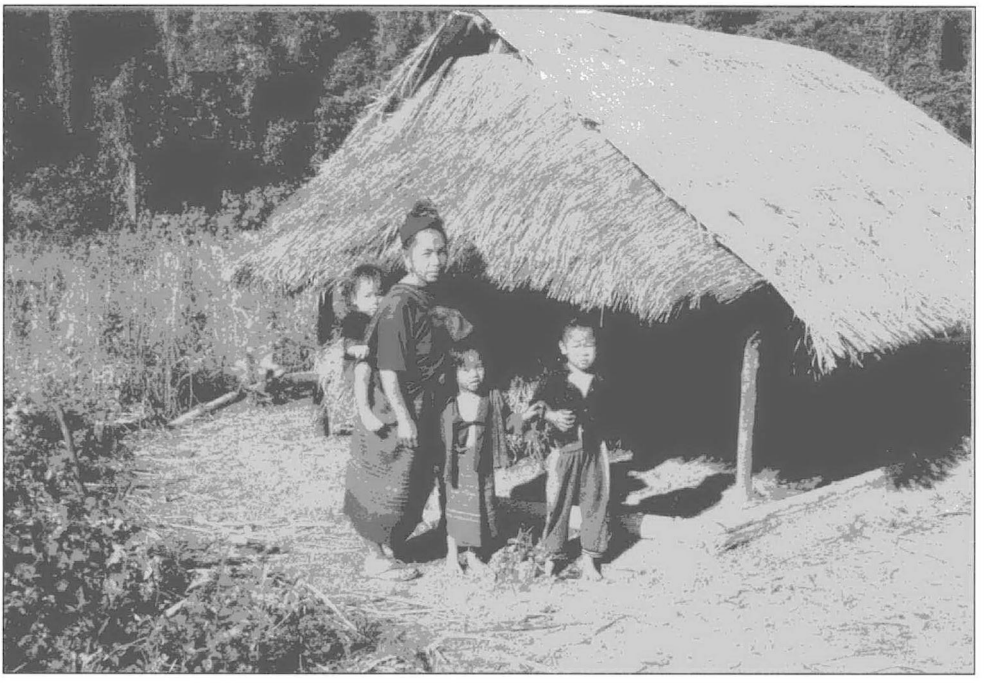

Photo 2. The Area Production Model describes how land is used by people over time for production and consumption of goods and services in forestry and agriculture under various assumptions about management, socio-economic and macroeconomic changes.

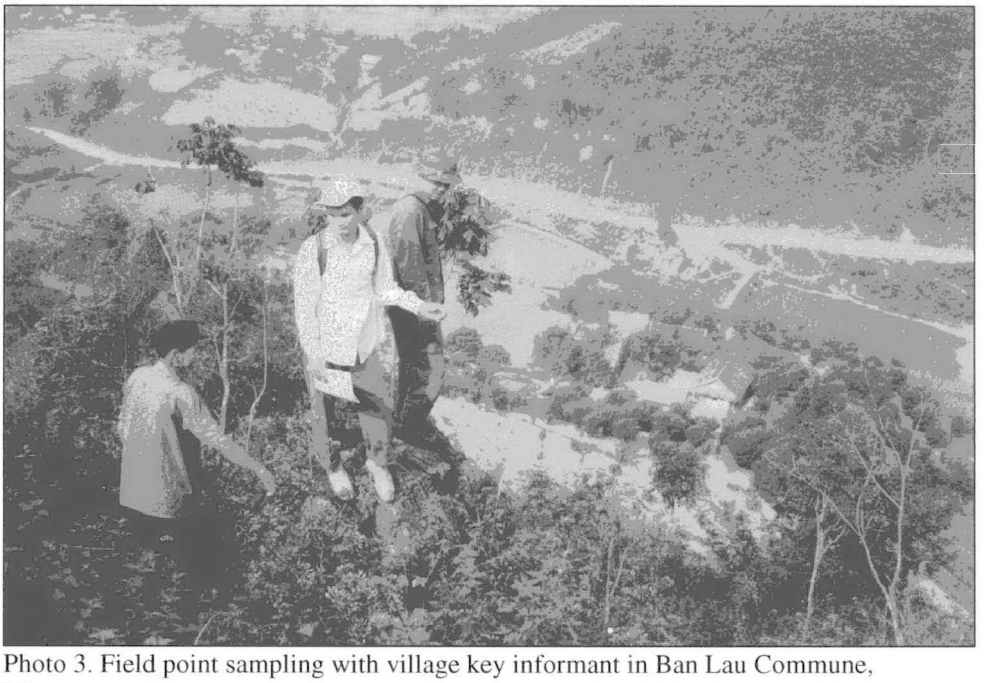

Photo 3. Field point sampling with village key informant in Ban Lau Commune, Vietnam.

*Paper IV*

A modified version of the research approach described in Paper I was used for analysing the land-use planning procedures in Vietnam in relation to an ongoing national reforestation program.

The approach, applied in the study of a commune and one of its villages, included field point sampling in combination with stakeholder dialogues for analysing the past and current land use and socio-economic situation. Possible developments and strategies were analysed by use of the APM.

When estimating the actual land use, there were significant discrepancies between the negotiated, "harmonised", data that were used in official planning and the field point sampling data. The study concluded that the extensive use of "harmonised" data in Vietnam made it difficult to assess the situation as is needed in strategic planning, and it sometimes lead to inappropriate land use strategies, as was shown in the case study.

Much land intended for the national Five Million Hectares Reforestation Programme, 5MHRP, was classified as "not yet used land" but was in reality used for food production. The farmers using that land are often poor and do not have the option to invest in forest plantation, although they represent a main target group of the 5MHRP.

## An approach to forest land management in Southeast Asia

This thesis concerns approaches on "strategic planning" in relation to forestland use. Strategic planning, referring to the process of elaborating appropriate strategies for achieving identified objectives, could take place on various levels of the society. In a sense, an informal type of strategic planning takes place regularly in every farm household who adopt individual livelihood strategies (Preston, 1998).

The starting point for the strategic planning discussed in this thesis is, however, the government level, which usually requires a more systematic and formal approach. In the study, the planning is seen in a wide sense and including the specification, collection and analysis of information and data, the development of appropriate strategies that could be implemented and continuously monitored, and also considering the required institutional and policy framework (Figure 2).

A number of planning components have been applied and evaluated in the study. Put together, these components (summarised herewith) can be defined as an "approach". The case studies in Laos and Vietnam and also the Lao-Vietnam workshop (Anon, 1999), provide some examples where the approach has been further developed into applications.

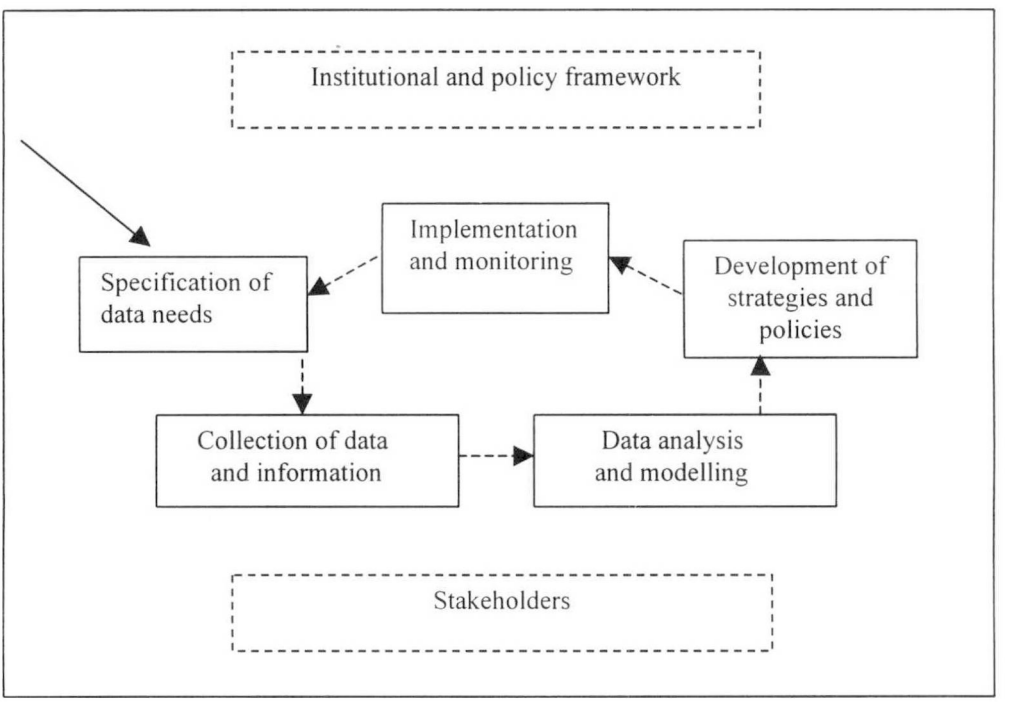


Figure 2. The strategic land use planning concept addressed in the Study.

*Cross-sectoral aspects*

Forestry cannot operate alone in an environment with many land users and stakeholders. Agriculture is often the primary use of "forest land". The local farmer, representing the major stakeholder group in most rural societies, is at the same time forester, agriculturist, businessman and researcher. Traditional land use planning undertaken by local households includes all those aspects. Therefore, government (strategic) land use planning should also, as far as possible, include all sectors and stakeholders.

*Planning from above and planning from below*

Land-use planning certainly concerns forest and agriculture land but also people, their problems, perspectives and life situation. Planning from above ("top-down"), using aggregated data for large areas is needed for obtaining a geographic coverage and for perspective analyses, but is often not enough in strategic planning. Planning from below ("bottom-up") can provide a better understanding of the local situation, but has other shortcomings. What is best for one village is not necessarily good for other villages or for the environment. The planning process requires significant and continuous interaction among government and local level (Nilsson-Axberg, 1993).

*The historical perspective*

The study illustrates the importance of paying attention to historical issues,

- For understanding the current situation.
- For testing assumptions and models.
- For quantifying short and long term changes.
- As a base for strategic considerations about what is likely to happen.
- For obtaining attention and an open discussion with local people.

*Combining different methods in data capture*

In the case studies, data and information from field point sampling and PRA could be verified by remote sensing (Laos). Official plans could be checked and further explained through PRA, field point sampling and satellite images (Vietnam). By combining different methods more accurate data was generated and better understanding of the current situation, ongoing changes and future opportunities could be obtained.

*Field point sampling*

One output of the study was the field point sampling technique for collection of current land-use data. It turned out as an effective tool for generating multi-disciplinary data in different environments and was also well suited for use in combination with the Area Production Model. The possibility to collect systematic data on historical developments, discuss tenure issues, market aspects and future land use options in the field came out as an initially unexpected output.

*Remote sensing*

Remote sensing was a useful complementary tool for verification of data and information from field point sampling and PRA. It also provided a geographical overview of the entire area and generated "indisputable" data (a photo or image has a good memory). However, when it is the only means of providing land use information it has its limitations. In the ideal situation, one can detect vegetation, trees and some crops, but certainly not people's use of those features or the purpose of the production.

*Participatory methods for capture of data and information*

Most forms of socio-economic and demographic data, tenure information and many other types of data are not possible to obtain without discussing it with the people concerned. PRA methods applied in a structured and systematic way (using checklists, stratified sampling of households and including field observations, e.g. "walk-talk-and-touch") proved to be indispensable for explaining and verifying the collected data and providing supplementary information.

*Official sources and "planning data"*

Official sources and planning data was another source of information. In centralised economies like Laos and Vietnam such data are available in all sectors of the country. Data originating from censuses or research could have high quality. Planning data could explain behaviours of officers and local people. However, especially data originating from reporting systems are often negotiated ("harmonised"). Such data should be used with care and involve quality control, as they often provide an incomplete or biased picture.

*The Area Production Model*

The use of APM in planning exercises and research studies was helpful for various reasons. It provided a frame for data collection (what types of data are required, who should be involved to provide the data etc). It helped bringing people into a discussion on strategic issues (about the future). The simplicity of the model made it necessary and sometimes encouraged people to innovate what is not directly reflected in the model.

At the same time the current version of the model has shortcomings, which deserve development efforts (local language, classification system, forest plantation module, bugs etc). The issue of how to reach a degree of sophistication that balances the advantages of simplicity with those of realism needs some consideration. Two versions might be desirable - one fairly simple robust version in local languages for participatory planning purposes, education etc. and one more advanced version for scientific use.

*Consolidation and dissemination of data and findings*

The inter-disciplinary research process allowed comparison and follow-up of collected data in discussions among researchers and local people related to the study area. Thereby data could be verified and explained and faulty information corrected. Dissemination of data in seminars, follow-up visits and through reports and minutes translated into local languages had several purposes. It was certainly a part of the consolidation aimed at obtaining feedback and informing the key players in the research. We also regarded it as a decent thing to do and a long-term investment in confidence.

## Discussion

The study could be discussed in the light of Agenda 21, Programme Area 10 (UN, 1993c), in which the broad objective is introduced as follows:

"To facilitate allocation of land to the uses that provide the greatest sustainable benefits and promote the transition to a sustainable and integrated management of land resources. In doing so, environmental, social and economic issues should be considered".

The UN programme, optimistically targeted for the years 1993-2000, addresses "governments at the appropriate level with support of regional and international organisations". It includes strengthening of such areas as; i) supportive policies and policy instruments, ii) planning and management systems", iii) public participation and use of appropriate management tools and iv) information systems needed for making decisions and evaluating future land use changes. It prioritises research in local environments on land resource systems and on the implications of management practices.

On the international level, the Forest Resources Assessment, FRA (FAO, 2001a), modelling of deforestation and climate changes (Angelsen and

Kaimowitz, 1998) and research on impact of economic policies (Seymour, and Dubash, 2001) examplify activities that support the UN Programme. The FRA, mainly under Program Area 11b (UN, 1993a) is an impressive exercise that has over the years become more extensive, standardised and adapted to new data requirements. It has introduced new technologies and increased participation by many countries. Despite that, the project admits that qualitative first hand information from the member countries on forest cover change has not increased in recent years and that the applied change models are over-simplified (FAO, 2001b).

Global data and models provide input to various policies of international organisations that affects national level strategies, programmes and laws, but the most important step is dealing with problems locally. Besides, an analysis based on heavily aggregated data may be of questionable value (Lambin, 1994). On the other hand local-level models covering small areas easily fail to recognise processes occurring on higher aggregation levels, such as trade or demographic effects of new infrastructure.

The present approach promotes local strategies in a national framework. In the study, it generated ecological and multi-disciplinary research questions, for example about the 5MHRP (Lung, 1999), on various effects of the land allocation program and about the realism of the APM tool. It provides an opportunity to identify strategic research issues for national institutions.

The approach was developed in countries with large numbers of small-scale farmers and stakeholders. Their governments express ambitions to influence land use for the benefit of environment and people (in policies and legislation). Most people in the study areas were fairly well settled. In regions with different land ownership and tenure, such as large forest estates, concessions or cattle ranches, other techniques may be needed as new issues arise. In countries with a weak policy or legal framework, the planning approach and point of departure must be different.

How to model the consequences on agriculture income of the AIDS crisis in Africa, for example? Many land-use conflicts concern activities by stakeholders who are not settled in the area. In cases with extensive migration, nomadic practices or when many people are active within an area but settled outside, the need to identify and address all the different stakeholders increases. The challenge in those cases is not always of how to modify models and inventory methods, although trying to adapt those tools for local use in a research environment could focus attention on

crucial issues. Often it is the "framework" (policies, communication, land management) that requires change. The concerned countries need to take the most active part in that development.

## Concluding remarks

The rationale of this research study could be summarised as follows;

1) The experience that erroneous policies and strategies has caused many land use conflicts, with negative socio-economic and environmental consequences as a result

2) The hypothesis, that improvement of the strategic planning process and the implementation of adequate policies and strategies could contribute to a better and more sustainable land use than so far.

The outcome of the study is an approach to strategic planning involving a number of considerations, methods and tools. The methods used in the different case studies should be seen as feasible examples, which may require adaptation when applied in other situations.

A considerate use of the approach could lead towards such results as; i) acknowledgement among decision makers and technical staff of the specific data requirements for strategic planning ii) establishment of a functioning cross-sectoral institutional structure for data analysis iii) feasible techniques and systems generating accurate and relevant data and information for strategic purposes iv) increased participation of concerned stake-holders in the strategic planning process v) a planning process that promotes continuous feed-back vi) development of appropriate modelling tools vii) relevant competence building and research viii) informed strategies based on consensus.

# References


Admassie, Y. 1995. Twenty Years to Nowhere. Uppsala University. Department of Sociology. PhD Thesis, pp. 43-55.

Anon, 1999. Inter-active and dynamic approaches on forest and land use planning – proceedings from a training workshop in Vietnam and Lao PDR, April 12-30, 1999. Swedish University of Agricultural Sciences, Department of Forest Resource Management and Geomatics, Working Paper No 60.

Anon, 2000. Agreements on environment and development. Swedish University of Agricultural Sciences, *Currents* No 22, pp. 31-39.

Boserup, E. 1965. *The conditions of agricultural growth. The economics of agrarian change under population pressure.* New edition published in 1993 by Earthscan Publications' Ltd.

Bryson, J.M. 1999. A Strategic Planning Process for Public and Non-profit Organizations. In: *Strategic management in public and voluntary services: A reader.* Elsevier Science Ltd, Oxford, UK.

Byron, N. and Arnold, M. 1999. What Futures for the People of the Tropical Forests? *World Development* **27**, 789-805.

Clement, J. 1995. NFAP (National Forestry Action Programme) update. 1995, No.32. FAO, Forestry Department, NFAP Support Unit, Rome.

Constanza, R., Wainger, L., Folke, C. and Mäler, K. 1993. Modelling complex ecological and economic systems: toward an evolutionary, dynamic understanding of people and nature. *BioScience* **43**, 545-555.

Contreras-Hermosilla, A. 2000. The Underlying Causes of Forest Decline. Center for International Forestry Research. Occasional Paper No. 30.

Donovan, D., Rambo, T., Fox, J., Cuc, L.T. and Vien, T.D. 1997. Development Trends in Vietnam's Northern Mountain Region. Vol. 1, An Overview and Analysis, National Publishing House, Hanoi.

Dove, M. 1983. Theories of swidden agriculture, and the political economy of ignorance. *Agroforestry Systems* **1**, 85-99.

Duncan, S. 2000. Undertaking fieldwork and getting data – a four-pronged research design. University of Leeds.Workshop Paper no 18 Prepared for Workshop Four - Methodologies for Researching Moral Agency, March 2000.

Fan C.M. and Fan L.S, 2000. Human Resource Development in Transition Economies. RISEC: - *International Review of Economics and Business* **47,** *15-31.*

FAO, 1995. *Forest Resources Assessment 1990.* Global synthesis. Forestry Paper No 124.

FAO, 1999. Status and trends in forest management. In: State of the world's forests 1999.

FAO, 2001a. *Forest Resources Assessment 2000*, FAO Forestry News, results as of 2001-01-19 (http://www.fao.org/forestry/fo/news/fonews/fra2000/fra2000-e.stm)

FAO, 2001b. The Global Forest Resources Assessment Summary Report. Committee on Forestry, 15th session, 12-16 March 2001, Item 8b on the provisional agenda, Rome.

Fernandes, W. and Menon, G.S. 1987. Tribal women and forest economy. Deforestation, exploitation and status change. Indian Social Institute, New Delhi

Flint, E.P. 1994. Changes in land use in South and Southeast Asia from 1880 to 1980: a data base prepared as a part of a co-ordinated research program on carbon fluxes in the tropics. *Chemosphere.*

Government of Lao PDR, 2000. Basic Statistics of the Lao P.D.R. 1975-2000. State Planning Committee, National Statistical Centre, Vientiane.

Government of Vietnam, 1996. Decision by the Prime Minister No 960/TTg on the long term orientation of the five-year plan for the period 1996-2000 on socio-economic development in the North Mountainous provinces. Hanoi, December 24, 1996.

Government of Vietnam, 1998. Decision by the Prime Minister No 661/QD-TTg. On Objectives, Tasks, Policies and Organization for the Establishment of Five Million Hectare of New Forest. Hanoi, July 29, 1998.

Government of Vietnam, 2000. Vietnam 1975-2000, Statistical Data of Vietnam Agriculture, Forestry and Fishery. General Statistical Office. Statistical Publishing House. Hanoi.

Grylle, M. 1997. Users Guide to the Area Production Model, APM, Version 2.0 for Windows 95 and Windows NT (final draft). FAO/FRA 1990. (The existing software (4 diskettes) can be achieved from FAO Forest Department.

Howard, C. 1998. Forestry in transition in Vietnam. *Commonwealth Forestry Review* **77**: 4, 249-253, 300-304.

Kaimowitz, D. and Angelsen, A. 1998. Economic Models of Tropical Deforestation - A Review. Center for International Forestry Research. Bogor, Indonesia.

Köhlin, G. and Ostwald, M. 2001. Impact of Plantations on Forest Use and Forest Status in Orissa, India. *Ambio* **30**, 37-42.

Lindgren, O. 1986. Simulation of Forest Resources Development – an introduction to the Area Production Model (APM). GCP/RAS/106/JPN, Field Document 11, April 1986. FAO Regional Office for Asia and the Pacific.

Lung, N.N. 1999. On "the 5 Million hectares reforestation programme". In: Swedish University of Agricultural Sciences, Department of Forest Resource Management and Geomatics, Working Paper No 60, pp 26-30 (also in *Forest Magazine*, 1997)

Manivong, K and Sandewall, M. 1992. Forest Cover and Land Use in Lao PDR - Final Report on the Nationwide Reconnaissance Survey. Ministry of Agriculture and Forestry. Lao-Swedish Forestry Co-operation Programme. National Office of Forest Inventory and Planning, Vientiane.

McElwee, P. 1999. Policies of prejudice: Ethnicity and shifting cultivation in Vietnam. *Watershed* **5**, No 1.

Mintzberg, H. 1994. *The Rise and Fall of Strategic Planning*. Prentice Hall, ISBN 0-13-781824-6.

Nabuurs, G.J. and Paivinen, R. 1996. Larg Scale Forestry Scenario Models – a compilation and review. European Forest Institute. Working paper No 10. Joensuu, Finland.

National Board of Forestry, 2000. SKA 99. Possibilities for forest utilisation in the 21st century. http://www.svo.se/ska99. (A report is forthcoming).

Nilsson, N-E. 1982. Outline to an area production model for long term forestry and land use planning (First outline of the model dated 1982-02-21. Nils-Erik Nilsson offers a reprint of the paper on request).

Nilsson, N-E. 1986. Industrial Forestry and its Integration with Social and Rural Development. FAO Field Document, GCP/RAS/106/JPN (Nils-Erik Nilsson offers a reprint of the paper on request).

Ohlsson, B and Sandewall, M. 1997. Sustainable use of forest land in Southeast Asia - a strategic planning approach with emphasis on specification, capture and use of data or "People's options on forest land use". Presentation of a research co-operation project funded by Sida/Sarec.

Nilsson-Axberg, G., 1993. Forestry sector and forest plantations sub-sector planning in South and Southeast Asia. Swedish University of Agricultural Sciences. Department of Forest-Industry-Market Studies. Report No 34.

Pandey, D. 1996. Tropical forest plantation resources. Assessment of extent and methods for yield estimation. Swedish University of Agricultural Sciences. Silvestria 11. Doctoral thesis

Persson, R. 1995. Den globala skogssituationen 1990. SLU, Department of Forest Resource Management and Geomatics (In Swedish). pp 89-112.

Poffenberger, M and Phon, N. H. 1998. The National Forest Sector. In: Stewards of Vietnam's upland forests. Asia Forest Network. Report No 10. January 1998.

Preston, D. 1998. Livelihood Strategies Improving the Environment? Heretical Views. Paper presented at the XXI International Congress of the Latin American Studies Association, Chicago, USA, September 1998.

Rocheleau, D.E. 1994. Participatory Research and the Race to Save the Planet: Questions, Critique and Lessons from the Field. *Agriculture and Human Values* **11**, Nos. 2 and 3, Spring-Summer, 1994, pp.4-25.

Roder, W. 1997. Slash-and-burn rice systems in transition: Challenges for agricultural development in the hills of Northern Laos. *Mountain Research and Development* **17**, 1-10

Rudel, T.K., Flesher, K., Bates, D., Baptista, S. and Holmgren, P., 2000. Tropical deforestation literature: geographical and historical patterns. FAO Forest Resources Assessment Programme Working Paper No. 27.

Ruthenberg, H. 1980. *Farming Systems in the Tropics*. Clarendon Press. Oxford.

Savenije, H. 2000. National Forest Programmes. From political concept to practical instrument in developing countries. National Reference Centre for Nature Resource Management. Wageningen. the Netherlands.

Sawathvong, S. 2000. Forest land use planning in Nam Pui National Biodiversity Conservation Area, Lao P.D.R. Swedish University of Agricultural Sciences, Department of Forest Resource Management and Geomatics, Working Paper No 80.

Seymour and Dubash, 2000. *The Right Conditions, the World Bank, Structural Adjustments and Forest Policy Reform*. World Resources Institute, Washington D.C.

Shari, I. 2000. Economic Growth and Income Inequality in Malaysia, 1971-95. *Journal of Asia Pacific Economy* **5**.

Sharma, P. 1992. *Managing the world's forests. Looking for balance between conservation and development*. – Kendall/Hunt Publishing Co.

Singh, A., Shi, H., Foresman, T. and Fosnight, E. 2001. Status of the World's Remaining Closed Forests: An Assessment Using Satellite Data and Policy Options. *Ambio* **30**, 67-69

Sodarak, H. 2000. Shifting Cultivation Practices by Hmong, Khamu and Lao ethnic categories in the Nam Nane Watershed, Nane District, Luang Prabang Province, Lao PDR. Swedish University of Agricultural Sciences, Department of Rural Development Studies, Uppsala. Masters thesis No. 10.

Souvanthong, P. 1995. Shifting Cultivation in Lao PDR, International Institute for Environment and Development. Forestry and Land Use Series No 5, London.

UN, 1993a. Agenda 21, Chapter 11, Programme Area D, Item 11.30. In: Earth Summit Agenda 21. The United Nations Programme from Rio. The final text of agreements negotiated by Governments at the United Nations Conference on Environment and Development (UNCED), 3-14 June 1992, Rio de Janeiro, Brasil.

UN, 1993b. Statement of Forest Principles. In: Earth Summit Agenda 21. The United Nations Programme from Rio. The final text of agreements negotiated by Governments at the United Nations Conference on Environment and Development (UNCED), 3-14 June 1992, Rio de Janeiro, Brasil.

UN, 1993c. Agenda 21, Chapter 10. Integrated approach to planning and management of land resources. In: Earth Summit Agenda 21. The United Nations Programme from Rio. The final text of agreements negotiated by Governments at the United Nations Conference on Environment and Development (UNCED), 3-14 June 1992, Rio de Janeiro, Brasil.

# Acknowledgements

In 1994, I asked my chief at that time, Professor Bo Ranneby for his advice on doing research. He encouraged me to formulate a project and apply for a grant. In the process, Professors Reidar Persson and Nils-Erik Nilsson gave their ideas that became pieces to combine with those of my own.

The project that evolved was inspired by several of my former assignments – the HUGIN/AVB85 project at SLU (scenario modelling and stakeholder discussions), the Bai Bang project in Vietnam (industrial forestry and local peoples' land use) and the NFI in Laos (forest survey and applied remote sensing for strategic planning). My former chief, Göte Bengtsson gave inspiration, my Vietnamese and Lao counterparts, Mssrs Tran Du Ai, Taa Huu Nhi, Khamphay Manivong and Silavanh Sawathvong provided the seed and patiently responded to my curiosity.

It became a slightly unfocused proposal on tropical forest inventory and strategic planning. Sida/Sarec expressed an interest to support the proposal provided that some revisions were made. I am greatful to the referee of that proposal, Dr John Palmer, who gave constructive recommendations. One of his observations was that the topic was multi-disciplinary and suggested the inclusion of researchers with social science background. Fortunately, I found interested and very qualified team mates who fitted the requirement.

The project finally involved three countries, various diciplines, institutions and stakeholder groups. Many persons contributed to the outcome and gave me a great pleasure of doing it. (Dear friends, please forgive my inability to mention you all by name or fully clarifying the significance of your input!)

At SLU, Umeå, sincere thanks go to Anne-Maj Jonsson, Gunilla Helgesson and Barbro Gunnarsson for their invaluable administrative support; to Kjell Lagerkvist for keeping my computer clean and running and to Per Löfgren for his excellent GIS assistance. My deep appreciation to Professors Ola Eriksson, Göran Ståhl and Håkan Olsson, also to my colleagues Sören Holm, Tomas Lämås and Ulf Söderberg for scrutinising my papers and giving significant comments. Professor Erik Valinger spent considerable efforts to go through the entire draft document for the pre-dissertation.
I would also like to acknowledge Mr Klaus Janz and his colleagues at the National Board of Forestry for promoting the project and making it possible to test our approach in the Lao-Vietnam workshop.

In Vietnam, Dr Nguyen Huy Phon, FIPI, has catalysed the project with his wise recommendations, promotion and encouragement. Among his staff, I would particularly like to mention Dr Hoang Sy Dong and Mr Vo Tri Chung. Also thanks are due to Dr Nguyen Phu Hung, Mr Vo Van Hong, Ms Tran Thi Binh, Mr Pham Quoc Hung and Mr Tran Van Hung, who have made committed input to the fieldwork. I am indebted to Dr Nguyen Quang Ha, former vice minister, and to Dr Nguye Duy Chuyen, Ministry of Agriculture and Rural Development. The leadership and the officials of Lao Cai Province, Muong Khuong District, Ban Lau Commune and the people of Lang Ha have greatly supported and facilitated the project.

In Lao PDR, the activity would not have been undertaken without the generous support of Mr Khamfeuane Kingsada and Mr Xeme Samountry with numerous officials at the Department of Forestry. My NFI counterpart at FIPC, Mr Thongphath Leuangkhamma, facilitated the work. His staff, Mr Khamma and Mr Sombat assisted in photo interpretation and field work. Mr Houmchitsawath Sodarak and his colleagues at the SCRP, were our enthusiastic research partners. Among them, Mssrs Somphanh, Vaya, Wandee and Ms Phonesavanh constituted a committed field team. At Luang Prabang Forestry Section, Mr Sianouvong Sawathvong, promoted the project and our seminars in co-operation with Nan District and the people of the Upper Nam Nan Watershed. Throughout the project, Mr Senephan Chanthavong and his staff at Scc Natura Office provided invaluable administrative support. Among the expatriates, Carl Mossberg, Paul Overgaar and Peter Jones have facilitated the study.

I had the advantage of access to two complementary supervisors, Professor Nils-Erik Nilsson and Associate Professor Ulf Söderberg, who have given good advise and comradeship. The long-distance jungle walk with Nils-Erik in heavy rain to an upland village in Laos was one of the highlights.

The co-operation with Bo Ohlsson was a great experience. It means a lot to have someone with different background and skills but similar interest who is available for commenting ideas at any time. Thanks, Gun, for letting me borrow Bo and for your generous hosting of our work sessions in Västerås!

It is great privilege to have the opportunity to work professionally with the person closest to you. It is far from being uncomplicated but it brings an extra dimension to life. Kajsa, I deeply appreciate your professional input, your concern for people at all levels that has greatly facilitated the project promotion and also your personal support in all parts of our life!